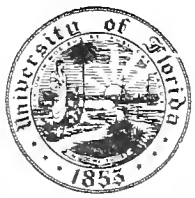

HOUSING DESIGN

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Contents

Foreword

This book is for those who are concerned with the physical design of housing: architects, developers, lenders, and students. It has been written because in my nine years of Government service in housing, I had occasion to examine approximately two thousand proposals for housing projects and frequently found that the plans presented ignored elementary principles of housing design which should be common knowledge, which, in fact, are the indispensable tools of the craft. On the other hand there were many projects which were designed with great competence by architects with fresh and brilliant ideas. From these I have learned much; indeed, this book owes much to what they taught me.

The attempt here is to express and illustrate these principles so that those who design housing may have them as a background and can go forward with their work without too much stumbling over details and the consequent waste of time. This is no encyclopedia of housing, nor does it pretend to give final answers to the complex problems of housing design, many of which arise from economic and social conditions beyond the designer's control. It will accomplish its purpose if it prepares designers to cope with those problems with awareness of the ways and needs of human living, if it prepares men and women who have inquisitive minds and who develop their own methods of attack.

A word to students. In housing, every act and decision affects the lives of others and may continue to do so for decades, hence clear thinking and intellectual honesty are essential.

Simple as this may seem, clear thinking is extremely difficult in an age of advertising slogans and high pressure salesmanship which try to force one's thinking into certain channels and often to sell an inferior product by a formula of laudatory words. How many "enriched" foods have added nutritive value which is but a fraction of what the processor has extracted initially? This method of using cliches to sell goods to the public is also present in the field of architecture. Half the words which are bandied around in the name of "modern architecture" at cocktail parties are of this kind. No great art was ever created or fostered by words; it has always arisen out of work in the shop. We must therefore try to judge things for what they are, rather than by the words that are currently used about them.

I shall content myself with citing three examples of contemporary architectural clichés:

"*Car-port*" "Port" implies a haven of added protection, but what you

really have is a substandard garage. "Car shed" would be an honest term. "*Butterfly roof*" What a vision of airy elegance this term brings up! The thing is a form that you may wish to use for specific reasons, but if you do, don't let pretty words blind you to the fact that you are using a type of roof most likely to amass snow, ice, leaves, and leaks.
"*Flowing space*" For my part I'm willing to let Albert Einstein decide whether space flows. Again, if you want open space, use it, but forget the cliché name, which hides the fact that usually this is space without visual, auditory, or olfactory privacy.

Use any architectural form or device that appeals to you as being appropriate, convenient, or beautiful, but beware of toothpaste salesmanship in architecture. Above all don't be afraid to think and act for yourself.

The reader will doubtless note the omission of foreign examples of housing. This is intentional. It is not prejudice, nor does it imply that we have nothing to learn from foreign countries. The reason for the omission is simple. At its best the housing of other countries expresses the living modes of other peoples, not of the American people. Study of hundreds of plans has revealed the fact that only a small minority would fit into our way of life. Those which would, embody the same principles of design which we consider here. After all, the origin of the examples is immaterial.

Eugene Henry Klaber
Cloud Hill, 1954

To the memory of three friends whose thinking and example have guided my professional life.

Robert David Kohn

Charles Harris Whitaker

Henry Wright

PART I: BUILDINGS

General Considerations

The word "Housing" has a broader meaning than "House." It embraces not only consideration of the physical structures in which humans dwell but also the relations of house to house, house to neighborhood and community, and house to the social, political and financial complexes which affect our daily life.

Housing is therefore one aspect of the broader field of social organization. Maladjustments in our social structure inevitably affect living conditions adversely. They are a principal cause of what we call the "housing problem." The broad objective of a housing program is to create an adequate supply of good dwellings for all income levels in the right environment, at the right time, and at the right sales price or rental. Such a program must recognize the fact that a dwelling cannot be dissociated from its environment. Our lives are not confined to the interior of the building in which we eat and sleep. They are adversely affected by drab and ugly surroundings; by noise, dirt and industrial odors. They are also affected by inadequate public services; by improper care of health and education; by lack of recreation and shopping facilities; by congested traffic and transit.

It is not to be assumed that "decent, safe, and sanitary" housing can of itself cure social maladjustments and assure a good life to all its occupants; the most it can do is remove certain obvious handicaps to social health. Many persons who have grown up in a slum environment have overcome this handicap and live significant lives. Good housing can be of real help to those whose successful living may hinge on added opportunities afforded by their physical environment.

Since the term "Housing" embraces the dwellings of the entire population, whether for high or low income families, for rent or for sale, for small or large families, in warm or cold climates, there can be no preconceived formula of design which will meet all needs. The architect cannot impose the program; it is forced on him by a careful study of the way of life of those who will occupy the housing. This should be obvious, but it is surprising how often we find designers who try to create life in their own image, assuming that what is the good life for them is right for everyone; cooperative housing for those who haven't the tradition, experience, or desire for cooperation; community facilities for people who would never conceivably use them. I recall an incident when an architect attempted the design of the ideal farm home for the Midwest, only to find that in a large part of the area farm life was entirely different from what he had assumed.

Income level

The wealthier the occupant of a house or apartment, the less hampering the problem of housing design. Be it a house or an apartment, rich people can pay the price of amplitude and indulge their preferences to the point of sheer waste. Consequently, we shall not discuss the single-family home for high income families. As we go down the income scale, the difficulties multiply. We must produce the maximum space that available money will pay for and often abandon the idea of individual preferences in favor of assumed average needs. When we have eliminated the superfluities of high income housing, the differences in basic *needs* of similar families, rich or poor, are not very great. Services, equipment, and gadgets may differ, but the minimum space required for living without undue friction is about the same; indeed, adequate space is most important to low income families, since they are most tied down to their living quarters. To many wealthy families, their town dwelling is a piéd-a-têrre, occupied for a few months when they are not in Palm Springs, Bar Harbor, or Europe. Even if their city quarters are cramped, ill-lighted inefficiency apartments, they are not too badly off, for they can afford to dine out at their pleasure and can get away frequently. For most families, the dwelling must serve all year round and afford the possibility of a complete and rounded mode of living. Space is the all important need. During the last twenty years the living area of houses offered for sale has been diminished constantly. This is the principal means the developers have found to hold sales price of houses down to a point where they are marketable in a period when material and labor costs are on the increase. The result is a lava flow of miserable cracker boxes in outlying urban areas throughout the nation. Apartment and row house planning have not suffered to the same extent. Older examples of these two types of dwelling were often miserably cramped, and since most new ones are in areas controlled by building codes, there has been some increase in room size above those customary in the prefabricated slums. But medium-rent apartments have tended toward fewer bedrooms. It is rare to find new construction with three-bedroom units. Families needing that many often must crowd into small units with persons sleeping in every available spot, with the consequent annoyances and interference with each other.

The lower the income, the greater the likelihood of overcrowding, and consequently, the problem of getting away from one another assumes added importance. Social contact is all too easy; privacy is difficult. As far as possible, the various activities of family life should be kept separate from one another. As an example, a dining space outside the living room affords parents a place to retire when their teen age children entertain company. For families with young folks an arrangement in which the parents sleep on a shelf opening into the living room verges on sheer stupidity. If mother is ill and the children are playing in the living room or if the par-

ents wish to sleep while the kids are cutting a rug with the radio going full tilt, there is going to be a fight in the family! The same considerations apply to the so-called "study" seen in so many plans, which is merely a part of the living space separated from the remainder by a six-foot screen.

sale or rental

A decision to sell or to rent dwellings which are being planned involves many differences in planning and construction. This is true in a measure even where a single house is built; all the more so when groups of dwellings are erected. In apartment projects these differences are less marked and are principally in the area of apartment and room size and arrangement. Thus if a cooperative organization wishes to build apartments for individual ownership and occupancy of its members, there must be a sufficient number of apartment types that no prospective tenant-owner finds it impossible to live there. This is not usually the case with the product of the private entrepreneur. He is most likely to build a limited number of dwelling types which in his opinion will have the widest market.

In the field of individual dwellings, the differences are more marked and affect the entire picture from site planning to specifications. If houses are to be sold, buyer demand and usually municipal regulations require that they have street frontage and individual connections to service mains. Obviously the land must be divided into separable parcels. These requirements cause considerable initial expense which could be avoided if an entire development were a single unit with houses for rent. This latter is the pattern of building for investment. It is rare in the United States. In Europe, the building of apartment houses for investment has been common in the past. Many a building has been owned by one family for over a century. When owners intend to hold a building for a long time, it is more likely to be well constructed, since they will have to keep it in repair, and carefully planned, since they will suffer any loss of value due to obsolescence. In our country large insurance companies have built housing for investment and they are well built, but usually a developer wants to sell out and clear out and keep his capital liquid. Nevertheless, there is a great need for single family dwellings for rent. This is witnessed by the fact that in 1940 only 37% of urban dwellings in the United States were owner occupied. At the same time we are informed by real estate developers and agents that individual homes as a field of investment are real estate poison. Why is this the case? I think it is largely due to the fact that individual houses have been built to sell. Even where not the product of the jerry builder, they lack that *added measure* of resistance to wear and tear which is essential in rental properties. These must have not only greater durability but also added safety features and more flexible planning than is the case with homes for sale. Above all, they must be so located, planned, and built that

economical management is possible. Consideration of management problems must be part of the planning process.

types of family

The principal kinds of occupants of housing with which we have to deal are the following:

1. Parents with one or more children
2. Childless couples, one or both of whom work
3. Single persons
4. Old couples or widowed persons living alone
5. Lodgers and boarders
6. Animal pets

Each kind has its typical needs and has several variants.

Families with one child are a simple problem. Normally they will have two bedrooms; if so, whatever the age of the child, it and the parents can usually have adequate privacy. Due to high rentals, this type of family will sometimes occupy a one bedroom unit. During infancy and until the child is three years old, this may be tolerable, although inconvenient in many ways. Thereafter, as the child develops a certain independence and new interests, it is not acceptable. With more than one child, questions of disparity of age, difference of sex, childhood, adolescence, or maturity have great importance. A boy of fifteen and one of five will not be happy sharing one bedroom, nor will the adolescent girl of dating age abide her moppet sister who is interested in what she does and is probably prying into her affairs. As a usual thing adolescents will want rooms of their own; in the case of brothers or of sisters who are thoroughly congenial a large room is needed; hence the second bedroom in a dwelling plan must be full size, capable of holding twin beds. Architects must not plan on the assumption of the minimum needs of children aged four. In his earliest years, a child's need of space can usually be satisfied in his sleeping quarters. Because of their outside associations teen agers begin to make heavy demands on living space, and major conflicts arise between parents and children. Here a third bedroom used as a study or a dining space separated from the living room will avoid many a conflict.

The normal unit for childless couples has one bedroom, living room, kitchen and bath. Something will depend on whether one or both of its members are gainfully employed. In the latter case, reduced cooking and eating facilities may be tolerable, since they frequently eat only breakfast at home. Perhaps such a couple can survive in a so-called "efficiency apartment," where they can't get away from each other and where the "strip kitchen" has no place to pour out a couple of plates of soup. This type of dwelling may be acceptable in inlying apartment hotels where restaurants are numerous and perhaps good. Elsewhere, the architect must assume that

couples without children will eat at home and plan for this accordingly.

Single persons living alone will frequently be entirely satisfied with one large room, kitchenette and bath. Such a unit demands little housekeeping. On the other hand, the more fastidious will object to their living space being in complete confusion until they have had breakfast and made the bed and will hardly welcome an early caller, be it a friend or the Fuller brush man. Two women or two men living together may be willing to share a single bedroom. Such associations are frequently temporary and casual, and the members not adjusted to each other's habits, as are married couples. A one-room unit is impossible for them. If they cannot share a bedroom, a single-bedroom apartment will oblige one of them to sleep in the living room. This always creates problems, especially if they each have different friends. Hence they will be happier with a two-bedroom unit.

Elderly couples living alone are just like other folks except for the fact that they are old. They usually enjoy quiet, but this does not mean that they want to be out of contact with younger people and in colonies by themselves. They do not want all those who live around them to remind them of their own aches and pains. At eighty my mother-in-law insisted on living in an apartment hotel frequented largely by college girls. Old folks cannot do heavy household work and do not want to climb stairs. Above all, they want to be near those they love, and if they have church or social affiliations in the community, they don't want to move away when they quit the old home, whose maintenance has become too burdensome. Some will prefer elevator apartments, some will want to live at ground level with a small private garden. Most of our suburbs have too few possible homes for those who have aged in their midst, who are cherished members of the community, but who now have no recourse other than to move elsewhere.

Many families have outsiders living with them to help meet the rent. Even if personally compatible, a lodger may be a source of trouble due to the dwelling plan. Where lodgers are common, planning should recognize the fact. A lodger should be able to reach his room without walking through the living room or otherwise disturbing the family. By preference it should be near the entrance door and at least have its own lavatory. Such an arrangement will avoid many minor troubles.

Only in single-family homes can pets be cared for adequately. They too need space and have physical needs to satisfy. One feels sorry for dogs who have to live in city apartments, and on cold or rainy days one can feel a measure of compassion for their owners who have to walk them out periodically. It would be interesting to know what percentage of cases of pneumonia are caused by people leaving overheated city apartments in inclement weather to allow Fido to tend to his needs. Kennels which give proper care to city dogs are possible only in expensive quarters.

Planning must care for the living needs of all these types of activities: cooking, eating, sleeping, elimination of bodily waste, sex relations, care of invalids, care and training of children, social life and entertainment for old and young, storage facilities, frequently also laundry work, auto storage and repairs. In some instances this has been done, but frequently many of these functions are ill served, due largely to cramped space, and some analysts find in this condition a hitherto unrecognized victim of our living pattern, namely Dad! Formerly everyone was sorry for Mother, who "stood eight hours over a hot stove." Modern technology has taken much of the drudgery out of women's work. But in diminished quarters, Father has no place to putter around, do odd jobs, keep his accounts or sulk. In serviced apartments, some of his healthful chores disappear; he doesn't even renew the worn out washers in the kitchen faucets. These analysts maintain that he has become the star boarder, with little or no contact with or influence over the family life. Let us not belittle the handicaps of cramped quarters, but let us also recognize that if Dad is merely a "star boarder," it is in a large measure his own fault. In any event, as planners we should consider his wants and activities most carefully.

types of dwelling

The principal types of dwelling in common use in this country are:

1. Detached single-family houses
2. Semi-detached houses
3. Group and row houses
4. Two and three story flats
5. Walkup apartments
6. Elevator apartments

Detailed discussion of each will follow, but a few introductory comments are in order.

By far the largest percentage of dwellings is represented by single-family homes. The layout of the house is a comparatively simple problem; not so the treatment of site planning, especially for developments of small homes on narrow lots less than 70 feet wide. Without careful study of the relation of each house to its neighbors and of variety of house plans, set back lines, and the outlook from each room in the dwelling as it will be located on the general plan, there is likely to be extreme monotony of appearance, lack of visual and auditory privacy between adjacent homes, and a view of the neighbors' wash from the living room windows. Since the houses are small units, the problem of achieving a pleasing architectural composition which will give a sense of individuality to groups of dwellings becomes increasingly difficult as the development increases in size. The average commercial developer makes no attempt at variety in planning and contents himself with producing a monotonous string of buttons, differen-

tiated, each from the next, by a change in color of material or of type of entrance door. Utter monotony might be better than the resultant chaos of color and form.

Semi-detached houses have a few distinct advantages. The party wall owned in common is an initial saving, and three exposures make a smaller demand on the coal pile than do four. With similar house and lot width, the space between the exposed walls of adjacent houses is doubled, affording greater possible visual privacy than detached houses in the center of the lot. There are several major disadvantages. One of a pair of houses may have a good exposure and the other not. Unless the lots are wide and the houses shallow, there is likely to be a great deal of wasteful corridor space. Usually semi-detached houses are narrow and deep. If the owner of one half decides to tear it down, the appearance of the remaining half is ruined for life. Unless both owners can agree upon repainting at the same time, the unpainted half is bound to look seedy and ludicrous if the buildings are of frame construction. This sad result is mitigated in a measure if the exterior walls are of masonry; even then, green shutters and window frames on one half and white on the other are unpleasant. This objection is not present in rental houses under common management.

Group and row houses are frequent in urban communities, chiefly along the Eastern seaboard. If well planned, they are one of the best types of urban dwelling and, in spite of a traditional prejudice, they are finding ready acceptance in urban and suburban centers throughout the country. With only a small front and back yard and two exposures to make demands on the heating plant, they have a strong appeal to the householder who has only a limited amount of time and energy to devote to his grounds after the demands of his normal occupation have been met. A row house two rooms deep is preferable to a detached house on a narrow lot, since it affords far better visual privacy. In the past row house planning has been poor. This is due to two factors: the attempt to reduce the cost per dwelling of sidewalks, streets, and public utilities, and the desire of the developer to create as many salable parcels as possible with a given street frontage. This has had unfortunate results: sliver subdivision with houses three and sometimes four rooms deep on frontages of fifteen or sixteen feet; worst of all, the creation of a pattern of narrow blocks and frequent streets, which virtually prevent any rational grouping of row houses. These frequent streets quickly create a heavy burden of street cleaning and maintenance for the community. In Philadelphia and Baltimore it is not unusual to find row-house sections in which streets consume 32% of the gross area. The inevitable result is worn out pavements and dirty streets. Later we shall discuss alternative subdivision methods which could obviate these faults.

As distinguished from apartments, flat buildings are those having

a single dwelling per floor with one family living upstairs, who have a private staircase to reach their quarters. In the writer's opinion they have a very limited usefulness under individual ownership. They can serve the need for a "mother-in-law" house or meet the wants of mutually congenial and related families who wish to live together. In these cases a single heating system will suffice and friendly relations can solve the problems of service and storage. In all other cases it seems advisable to have an individual heating system for each dwelling. This type of building is common in many Midwestern cities. The houses have been sold with the idea that the purchaser could live rent free with the money obtained from the extra flat, even when he, as landlord, pays for repairs and water supply and furnishes heat to the tenant. The fact of the matter is that ownership of a flat is a questionable investment. In the first place the purchaser has bought a permanent job as janitor and repairman, since minor repairs by outside mechanics are inordinately expensive in such a small-scale operation. Nor does the sales propaganda discuss the question of vacancies. What happens to the rosy prospect of living rent free if the second story flat is vacant for six months? No dice! On the other hand, flats can serve a real purpose in rental housing projects by providing one-bedroom units, which are more difficult to arrange in row houses.

Walk-up apartments are a useful type of dwelling for urban or suburban areas and usually permit better unit planning than elevator buildings. In the latter, the heavy cost of installation, operation, and maintenance prompts the developer to serve as many apartments per floor as possible with one elevator stack. This leads to wasteful corridors and frequently to compromised unit planning. A two or three story walkup can afford more frequent staircases if they help avoid public corridor length on each floor. Walkups more than three stories in height are open to question, especially if the rentals on the upper floors must be lower than those below. In a large apartment development in Chicago with $16 per room per month rentals on the three lower floors, it was found that with a reduction of one dollar and two dollars per room per month respectively on the fourth and fifth floors, there would be no additional net return to the owner. The building of five and six story walkups was common in the Bronx prior to the depression. When the crash came and many families were forced back to the slums of lower Manhattan, there was an enormous vacancy in the three upper floors of six story walkups in that area. Six and seven story walkups are common in Continental capitals of Europe. Here too, rentals decrease with each flight of stairs above the second floor. One result is that in addition to a vertical income stratification between neighborhoods of greater or less prestige, there is a horizontal stratification by floors. It is not unusual to find poor people living in the same building as the wealthy.

Low walkups meet with frequent objections in suburban communities because owners of single homes feel that their erection will affect the values of individual homes adversely. This feeling is doubtless due to the idea that apartments of necessity will crowd the lot lines and present a vista of unbroken walls. The many garden apartment groups designed by skillful architects are beginning to make headway against this feeling. If the job is done well, it fits perfectly into, and indeed enhances, the setting of fine trees and garden space of which our suburbs are justly proud. Such garden developments are far more desirable than the usual builder's subdivision of small individual houses on narrow lots.

As a usual thing, elevator apartments are found where land prices are high. Sometimes this is their only plausible justification. In other instances they are erected to exploit a desirable view, be it in the city or the country. They have patent advantages. The upper floors are above the level of heavy street dust and in warm weather are more likely to enjoy any breeze there is. In dense urban areas the aggregate of elevator buildings reduces the average travel distance of the occupants. On the other hand, they give rise to many problems. The reduction of travel distance is counterbalanced by slowness of travel due to crowded streets and transit media. If their use is open to question, it is mainly because they create too great a density of population. Even if entirely desirable and acceptable within the lot lines of the ground on which they are built, their aggregate effect upon the community as an operating urban mechanism may be disastrous. Sixteen story apartments in the open country set in acres of land and with low coverage and population density are entirely justifiable. This is not true in the city when they are crowded together, stealing each other's light and making the streets gloomy canyons flanked by high walls. This problem of adequate light has been avoided in the large scale elevator apartment developments of low coverage built by insurance companies and public authorities. However, they do nothing to relieve urban congestion and overcrowded schools. In fact they aggravate these very conditions.

As a place to live, elevator apartments serve the needs of many families admirably, particularly those in the higher income brackets. Assuming that they have enough rooms and space for comfortable living within their apartment, a high-income family can manage its outside contacts and those of its children successfully. Taxicabs take them anywhere; the children are called for at the door and returned there by the bus of the private school they attend. Servants can supervise the home life of children in their parents' absence and can accompany them in a cab to and from their meetings with other children.

On the other hand, low-income families with children other than infants are not well housed in elevator buildings. If a mother takes entire

charge of the home, supervision of outdoor play of her children is virtually impossible. If little Mary doesn't return at the appointed dinner hour, mother can't summon her by yelling out the window.

It has been contended with some degree of plausibility that, if well planned, elevator apartments cost less to erect and operate than walkups. When this contention is based on figures which include land cost, it is meaningless. Even when this is not the case and the cost can be shown to be less, we must ask ourselves what we have produced with the money spent. Of two plans compared, which permits a more satisfactory life? That should be the aim of housing, and it is entirely pertinent to ask why one should expect a better product to cost less than one which is not so good. We don't expect this in buying clothes.

community facilities

Such facilities are of two kinds: those which provide for needs which should normally be met within the private area of each family but which by default must be provided in common on the premises, and those which afford the wider social and recreational opportunities not usual in individual homes. In the former category are common laundries, drying rooms or yards, storage rooms for surplus household goods, bicycles and perambulators, provision for waste removal, parking space and garages, play areas for young children, and small workshops. The latter category includes nursery schools, play fields, picnic areas, stadia, meeting rooms, auditoria, dance halls, and theatres. It is to be noted that the first group consists of items which are the responsibility of the developer. Provision of the second group is properly a community function. Where communities have been unable or unwilling to furnish these facilities, many projects, especially in public housing, have been impelled to include some of them. If this is done in a public project, the use of such facilities cannot properly be restricted to residents. This distinction of category should be recognized in computing the cost of a housing project, and the amount spent on the normal requirements should be segregated from that which is paid to make up for a community deficiency.

climate

Very few countries have as wide a range of climatic conditions as has ours. They vary from lush farm land to desert, tropical heat to sub-polar cold, high precipitation to almost none, gentle winds to hurricanes, blinding sunlight to almost constant overcast. It would be logical to design housing to meet the needs imposed by weather conditions. Many sections have developed an indigenous architecture in the past. The balconies and garden courts of New Orleans, the stone houses of northeastern Pennsylvania, the ranch houses of the cattle country, the California bungalows are typical examples. If means of communication and knowledge were not so wide-

spread, we would by now have fully developed regional architectural types as distinctive as the architecture of the hill towns in Italy. But illustrated magazines circulate pictures of well designed housing throughout the country, and if a given type evokes popular enthusiasm, it is likely to be aped in a bastard form anywhere throughout the land, even though it is entirely inappropriate to the local climatic conditions. Ready cut and prefabricated houses promote the trend, especially if they promise lower first cost.

Consequently, it behooves architects to study the climate of the area in which they work so that the forms and constructional methods they use make sense. One of the best guides to this end is the series of "Regional Climate Analyses and Design Data" studies promoted by *House Beautiful* and published in the *Bulletin of the A.I.A.* These are careful scientific presentations of data and recommendations for construction. The architect cannot embody them in his work in complete detail, but if he studies them, he will have a clear picture of the pattern appropriate to each region.

racial and religious requirements

It is characteristic of our American culture that people of all racial and religious backgrounds quickly adopt customary modes of living even if they are newcomers. Hence it must be assumed that there is seldom any reason for differences in planning for one or another. Perhaps the only room whose planning may possibly be affected is the kitchen. People of certain racial backgrounds lay more stress on their traditional cuisine than do others. As an example, Orthodox Jews observe strict dietary regulations which require that different cooking utensils and dishes be used depending on whether meat or milk products are served. The utensils in each case must be kept separate from the others. From the point of view of planning, this merely means more shelf space in kitchen cabinets. This is equally true of most kitchens in small units. Other than this, the matter of racial and religious background should in no way affect our planning.

esthetics

Many of our public housing projects are open to the criticism that they are drab and monotonous in appearance and as a consequence have a depressing effect on their occupants. Physically they are infinitely better than the former quarters of the tenants, but they may well be called "emotional slums." An endless succession of identical and parallel apartment buildings is just as deadening as the row houses of Manchester or Philadelphia.

There are two basic reasons for this lack of amenity. With the stringent limitations of cost per unit imposed by Congress, designers have been obliged to figure every cent of cost and produce a maximum number of dwellings, leaving little and sometimes nothing to spend on better grouping and on planting. Snobbery also enters into the picture. Many persons who pay or who collect commercial rentals want public housing to bear the

visual brand of poverty. They look upon public housing tenants not as normal people with normal needs but rather as a lower order of men, undesirable as neighbors, and of necessity personally delinquent since they are unable to pay commercial rentals. Those who hold these views gauge their own needs on standards of luxury. For them life must be some sort of simulacrum of Fifth Avenue or Hollywood. Their less wealthy fellow citizens must not expect to enter this charmed circle of make believe, and the place where they live must make them realize this fact.

The snob attitude cannot be cured by governmental action. To eliminate the barracks appearance of public housing demands adequate funds for the creation of amenities, for when we have satisfied bare physical necessities, we are entirely justified in spending a moderate additional amount to create a truly human environment.

Dr. Anthony F. C. Wallace[1] has stated the question of esthetics admirably. "The three main purposes of public housing . . . . go far beyond the economical provision of the maximum number of dwelling units wrapped up in a pretty package. The architect is designing the mold in which a whole community is cast and has a responsibility not to allow his enthusiasm for a current (or avant garde or passé) standard of esthetic desirability to freeze the pattern of social relationships in undesirable forms for thousands of people for fifty to one hundred years." This is equally true of designing for barebones economy.

the expendable house

The waste and inefficiency of past processes of home building with the consequent high cost to the consumer has prompted many persons to look for a solution through mass production of houses with an anticipated short life. If a complex mechanism like an automobile can be turned out by the million at far lower cost than if production were on a small scale, why not do the same thing for houses, built only sufficiently well for a ten or fifteen year life? This idea is plausible but thoroughly unrealistic. Let us consider a few of the implications.

1. Can we build houses with the expectation that they will disappear in that time? Here arises one of the main differences between a house and a car. If an old auto is starting to go to pieces, the owner, probably the fourth or fifth in line of ownership, can drive it into the woods and walk away, or he can sell it for scrap. A car is not chained to the ground, whereas a house is, not only by its foundations and utility connections but above all by debt. Bad as it may be, the holder of a mortgage looks upon it as part of the value which secures his loan, even if it is merely a nuisance value. So there it is and there it stays unless public authorities condemn it as unsafe. Houses cannot be designed to disappear at the expiration of the mortgage,

[1] "Housing and Social Structure" Phil. Housing Authority, 1952.

and we may be sure that they will persist beyond that time and that any compromise of substantial structure is the promise of a future slum.

2. Any possible economy in cost of materials and labor will not affect a proportionate reduction in sales price, since today only about 60% of that price is represented by these costs. To reduce the price proportionately we would also have to reduce the 40% represented by land cost, utilities, sales costs, and profits. Thus if through machine production we could reduce the cost of labor and material 40%, the sales price would be reduced only 24%.

3. Mass production depends for its continuance on mass destruction. Let us ignore the enormous waste involved in this dual process. Machinery for mass production is enormously expensive. The machines must be fed. Consequently the auto manufacturer must promote next year's dissatisfaction with this year's product. This is sometimes done by improved mechanical design and equipment, occasionally by built-in depreciation. When these stimuli to buying fail, style changes are introduced and publicized by multi-million dollar advertising campaigns in an effort to make the purchaser of a car as sensitive to style changes as women are to changes in style of clothes. Mass machine production has its valid uses but inevitably involves the danger of a saturated market, followed by economic disruption.

4. Is there a sufficient market for houses to warrant the expense of a mass production technique? The important factor here is the problem of depreciation. If a man buys a car, he usually expects a useful life of four or five years at most. At the end of that time he expects to trade it in and buy a new one. If he hasn't the necessary money, he may continue to use it with mounting repair bills, or in the worst case do without. On the other hand, a home is a cardinal necessity, and the man who buys a house expects it to last at least forty years. What does this mean?

There are nearly 160,000,000 persons in the United States. Assuming an average of 3.25 persons per family, there are 46,000,000 families. A forty year depreciation means that 1,400,000 dwellings should be replaced annually. But many people who would scorn a 1942 car are still content to live in an 1896 house, and we may assume that at least 60% of our 1,400,000 dwellings will be used long after the forty years have expired, if not by the original owners then by those perhaps less wealthy. This brings us down to 560,000 new units as an average annual demand. How many of these will be in multi-family dwellings, how many of special types to meet individual needs, how many plank houses in the woods or adobes in the desert? If these represent only 30% of new dwellings, there remains a possible 392,000 susceptible to standardized construction. Divide by 300 working days and we have a production of 1300 units per day for the entire country. Is this a

prospect that warrants the building of the great organizations and making the expensive machinery that mass production requires? The above is not a diatribe against machine production but merely an attempt to examine critically the limit of its potentialities.

standardization

Whereas mass-production of houses seems to have a limited market which is somewhat difficult to estimate, that of prefabricated parts is easier to gauge at a given moment. Material and equipment manufacturers have done excellent work in the standardization of their products and equipment. This is of especial value in periods of shortage, when purchasers cannot be sure of buying items of a preferred producer. The five-foot bathtub, doors and windows and lumber of standard sizes, make buildings easier in such times. The writer is of the opinion, however, that additional standard lumber sizes are in order to meet the needs of home construction. At present, floor joists come in an even number of feet and room widths are consequently slightly over seven, nine, eleven, etc., feet, if the joists are used without cutting to waste. An eight-foot-wide kitchen, a ten-foot bedroom, and a twelve-foot living room are much better than rooms one foot narrower in each case (Figure 1). After all, the lumber should fit the room; the room should not be cramped to conform with lumber sizes. In a word, there should be such a thing as "housing lumber," whose length is an odd number of feet.

modules

The use of a standard measure in the layout and design of buildings has been attempted repeatedly. The value of the objective is obvious, a simplification of the building process. Today many architects are attempting to build to a module, and the architectural press frequently publishes plans criss-crossed by a rectangular grid of lines. Theoretically the entire layout conforms with the grid, but a careful examination of the plans reveals the fact that in almost all cases there are so many departures from the module that there could be very little saving in using it. Modules are entirely applicable in buildings with large unbroken areas but are of questionable value in residential construction, especially in small homes because of the great variety of conditions that must be satisfied in a small space. In apartments of skeleton construction, a regular spacing of lines of columns has decided advantages as far as economy of construction is concerned, but the determination of the spacing must be carefully studied in relation to the rooms produced. In a well-known apartment building a spacing of twenty feet between column centers was used in parts of the plan. Two bedrooms were fitted into this bay width, one 11′6″ wide, the other 8′ (Figure 2). The principal bedroom is of generous size, and the smaller is adequate for occupancy by a single person but not by two. If the width of the bay had

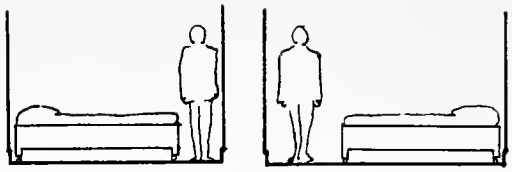
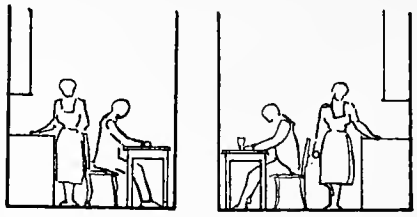


Figure 1. Bedroom 9 feet (2.7 M) wide and 10 feet (3 M) wide. Kitchen 7 feet (2.1 M) wide and 8 feet (2.4 M) wide.



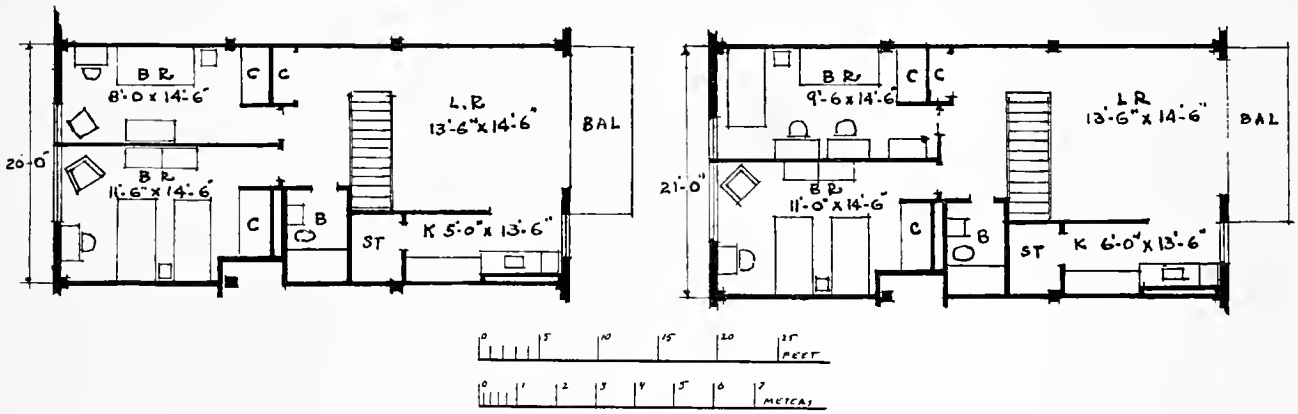


Figure 2. The apartment on the left, with a width of 20 feet, allows for occupancy by three. The apartment on the right, with a width of 21 feet, allows for occupancy by four.

been one foot more, the room widths could have been respectivly 11′0″ and 9′ 6″, and the smaller room could have been used by two. Would not the added rental value compensate for the greater cost?

modular coordination

We have mentioned standardization of building materials and appliances. What has been accomplished has been largely within the limits of indi-

vidual technologies. Modular coordination has the objective of doing the same sort of thing right across the board, dimensioning products of different types so that they can be incorporated in a building and fit together without cutting. The modular unit is small, four inches, an excellent idea, since its adoption does not create insuperable problems of change in manufacturing processes. The adoption of this system encounters certain difficulties, chief of which is the ingrained habit of considering those parts of a building which will not show when it is completed as something that may be damaged and carelessly assembled, the resultant irregularities to be straightened out with the finishing materials. If this handicap can be overcome, modular coordination should prove to be an extremely valuable improvement of building technique.

housing standards

"Let us raise a standard to which the wise and honest can repair." When Washington wrote these words, he could hardly have contemplated what today are called "housing standards." As currently used, this term means a compendium of the worst that a building code, a governmental or private lending agency is willing to permit in a housing project. Those "standards" which are motivated by a concern for structural and fire safety are often good, but by and large codes and regulations take no cognizance of the living needs of the people who will occupy the housing. Due largely to monetary stringency, architects have been obliged to design their housing projects down to minimal tolerances rather than up to a true standard; they are based on what people can afford, not on their essential needs.

In this book we do not concern ourselves with compromises; the attempt is to derive our planning methods from considerations of how individuals and families will be able to live and function with reasonable comfort and pleasure in the rooms, buildings, and environment produced. If we have succeeded, we have created standards, that is, norms of housing, neither maxima nor minima, not a regulatory code, but something to which men "may repair." If then we must make compromises, we can at least measure their degree.

In practice some compromise will inevitably be necessary with respect to this or that detail of planning; but compromising, like drinking, should be done in moderation, for if every element of design is based on "minimal standards," the aggregate is sure to be substandard housing. How far shall we go in compromise? This is a question of judgment, but for the writer, in housing as in baseball, three strikes are out!

In this introductory chapter, we have discussed certain general considerations of housing. In succeeding chapters we shall discuss the technology of planning, starting with the simpler elements, furniture and rooms, proceeding then to more complex matters.

Furniture

In designing any dwelling, the architect must obviously take into account the furniture that the occupant will use. Sketch plans should always indicate furniture positions, since he must be sure that doors, windows, and necessary circulation space do not preclude the placing of an adequate number of pieces. The simplest method of studying furniture layouts is to use scale cut-outs of the pieces. How much furniture should he assume and of what size? There can be no rigid criterion, but it must be adequate to accommodate the normal needs of the maximum number of persons who can occupy the dwelling unit without overcrowding. This is determined by sleeping accommodations. A three-bedroom unit will evidently require more living and dining furniture than one with a single bedroom.

If the architect is working for a client whose family will occupy the home, the problem is comparatively simple. The owner may already have furniture; if not, a study of the mode of living of his family and their personal preferences will be his guide.

In housing projects, whether the units are for sale or for rent, the future occupant is unknown and the architect must make assumptions as to what furniture will be needed, not by the first occupant but by series of tenants or owners. A few general principles should be observed.

1. Furniture should be assumed to be of the larger commercial sizes; if it will fit in, smaller pieces will evidently do so. It must not be assumed that low-rental projects can be an exception to this rule. People of low income may use second-hand pieces. Cheap furniture is frequently made larger in size to compensate in eye value what it may lack in other respects. Although the principal pieces must be assumed to be large, a small proportion of furniture can be presumed of smaller size, since few families have only large pieces.

2. In all but high rental projects, the pieces will usually be arranged along the side walls of the rooms, since the width of the room will probably not permit free-standing furniture.

3. Pieces should not fit tight in available space. They must be readily movable for cleaning and bed making if they are not to be a burden to a housekeeper who isn't content to sweep the dust under the rugs. By the same token, built-in furniture is inadvisable in apartments. Vermin can spread along water and heating pipes from a careless tenant to a clean household and built-in furniture makes a wonderful nest for bugs.

4. The assumed furniture should leave adequate space for passage and living activities; indeed, there is such a thing as a maximum percentage of tolerable coverage, much as in site planning. If we assume a two foot strip along the side walls as available for furniture, a room ten feet wide will have a coverage of 40%; eleven feet, 36½%, twelve feet, 33⅓%. Tolerable maximum coverage will vary with room use. There is no fixed rule. For what it is worth, the writer recommends the following maxima: living rooms, 33⅓%; dining space, 55%; bedrooms, 40%.

living room furniture

The most important factor in arranging a living room is the possibility of group seating for social purposes. People must be able to look toward each other without discomfort, and since their legs project beyond the furniture, there must be enough clear space that they do not step on each other's toes. The long straight couch (Figure 4-B) may be a very handsome decorative feature and serve as an overnight flop for stray bachelors, but it is awkward for conversation. Projecting legs create a problem at corners as shown in A and C. In both cases there is a loss of seating space unless the corner is curved as shown in broken lines in C. If there is a fireplace in the living room, it should be the focus of the conversation group. This always requires considerable space as shown in D. The grouping is easiest when the fireplace is in the longest wall of the room. Fireplaces poked into corners may be all right for grandma to do her knitting and grandpa to read Gibbon's *Decline and Fall* but are hardly suitable for a family gathering.

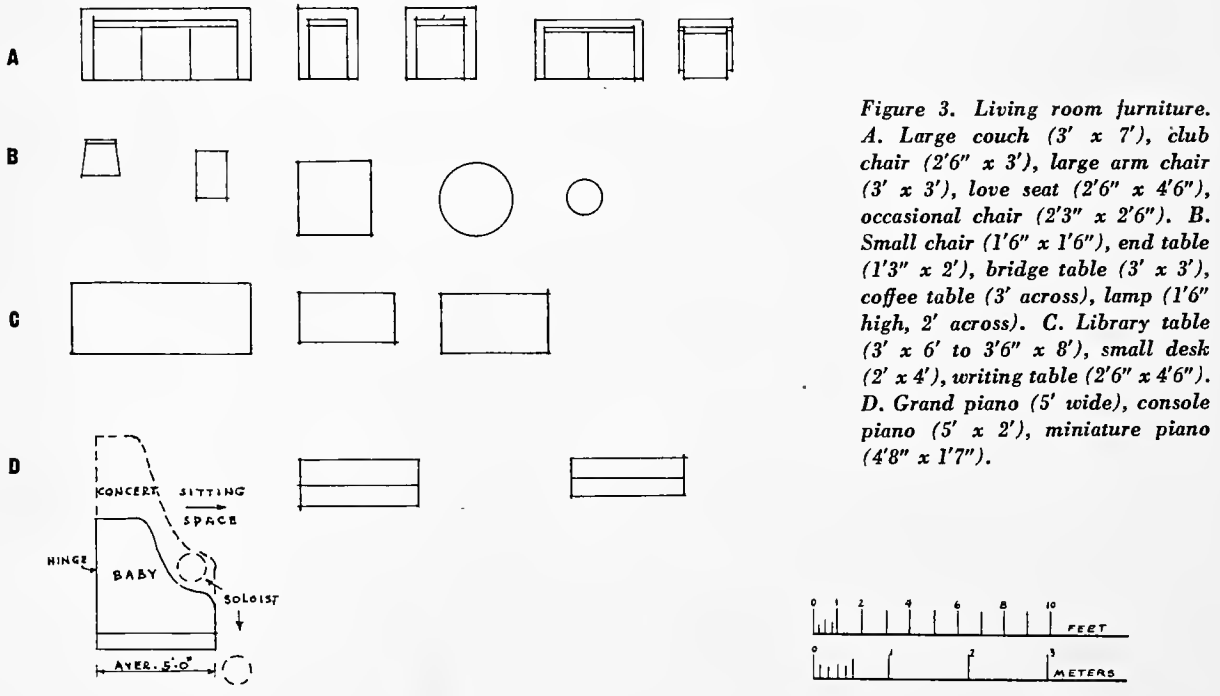


Figure 3. Living room furniture. A. Large couch (3' x 7'), club chair (2'6" x 3'), large arm chair (3' x 3'), love seat (2'6" x 4'6"), occasional chair (2'3" x 2'6"). B. Small chair (1'6" x 1'6"), end table (1'3" x 2'), bridge table (3' x 3'), coffee table (3' across), lamp (1'6" high, 2' across). C. Library table (3' x 6' to 3'6" x 8'), small desk (2' x 4'), writing table (2'6" x 4'6"). D. Grand piano (5' wide), console piano (5' x 2'), miniature piano (4'8" x 1'7").

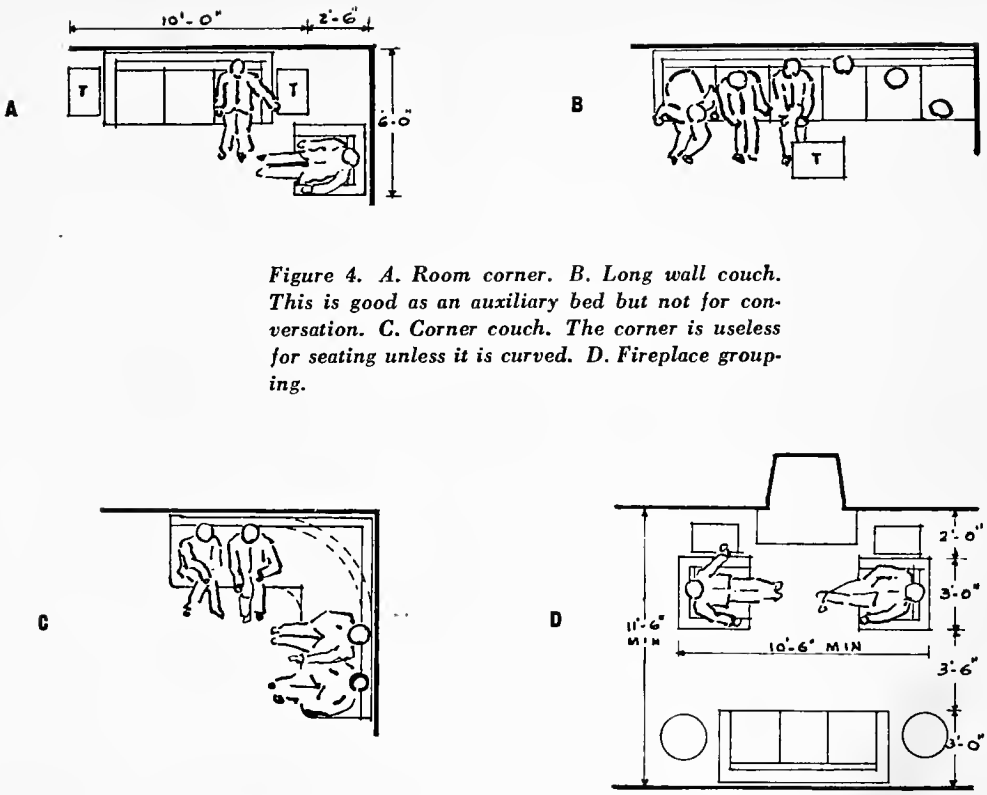


Figure 4. A. Room corner. B. Long wall couch. This is good as an auxiliary bed but not for conversation. C. Corner couch. The corner is useless for seating unless it is curved. D. Fireplace grouping.

dining furniture

In modern housing, dining space has constantly been reduced. To a certain point this is entirely justifiable; the old-fashioned dining room which had only occasional use except at meal times is properly out of the picture. On the other hand, some architects allow too little space for eating. In the struggle to keep down costs by space reduction, dining space is usually the first victim. This trend is promoted by government agencies whose operations are hampered by Congressional restrictions of room cost.

To justify larger expenditure, dining alcoves and foyers are counted as one-half room each, even when the space is merely a slight widening of an entrance hall. To make inadequate space appear ample, some architects indicate the dining furniture as shown in Figure 7-A, with the chairs tucked under the table. This practice is deceptive; chairs should be shown as they will stand when occupied.

Two feet of table length per person should be allowed for straight tables, but when chairs will be used at the end, additional length is necessary to allow for dishes above the table top and leg room below.

Where small dining tables are placed along a kitchen wall, as in C, the kitchen should be at least 7′ 0″ wide to allow for passage along the bank of fixtures on the opposite side.

Built-in dining alcove sets, E, are space savers and are adequate, once the occupants are seated. However, those on the inside cannot leave the table without disturbing their neighbors. Obviously there is no room for occasional guests. Sweeping crumbs from under the benches requires stooping or crawling, since the benches cannot be moved.

Round tables make general conversation at table easier but usually require additional space; compare F and H.

Our civilization is in flux, and since the home has invaded the dog wagon, it is not surprising that the dog wagon has also invaded the home.

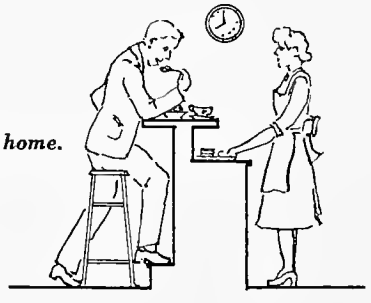


Figure 5. Dog wagon in the home.

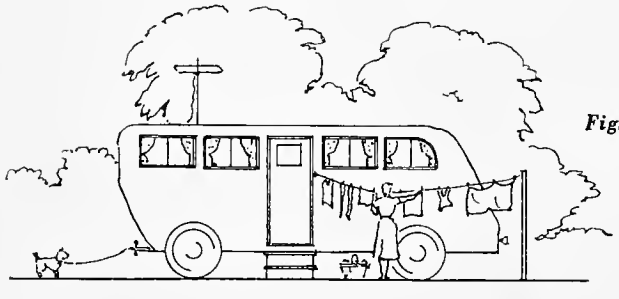


Figure 6. Home in the dog wagon.

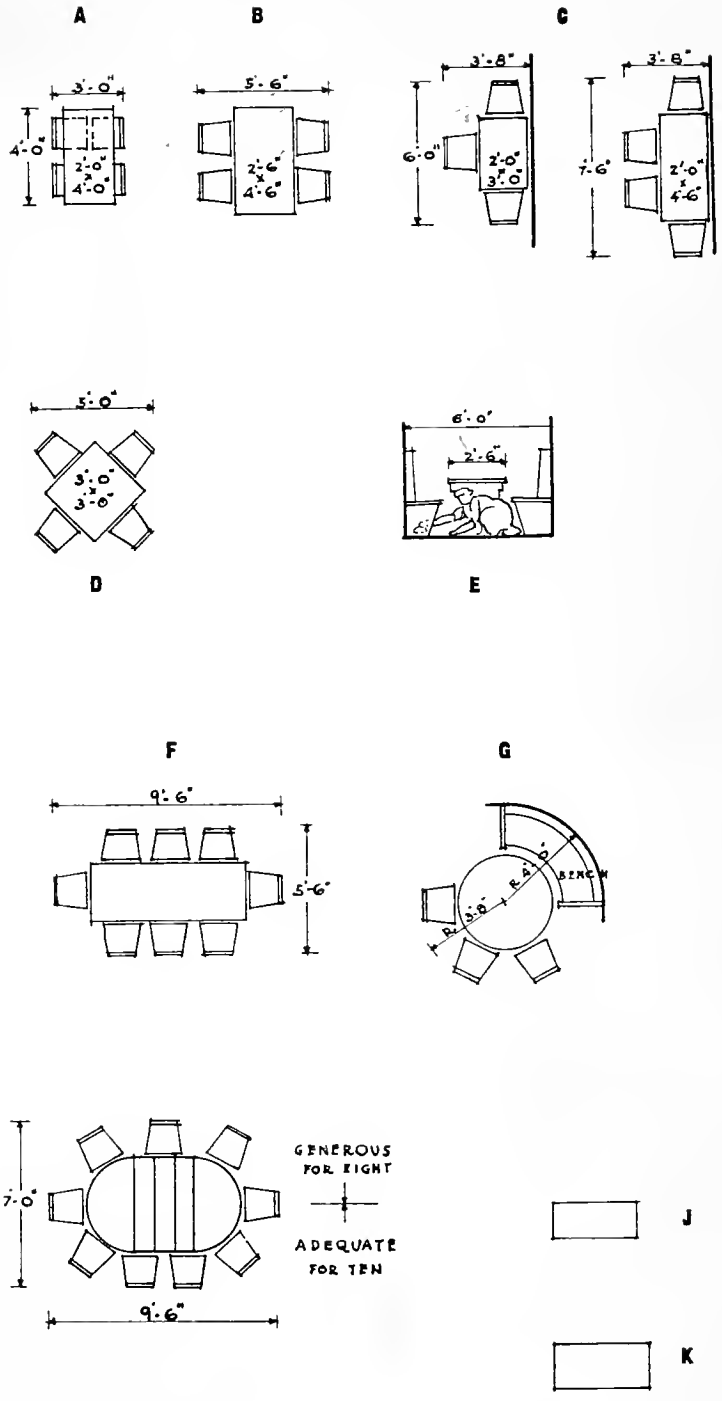


Figure 7. Dining furniture. A. Kid yourself about the space a dining table and chairs occupy if you like. B. Average requirement. C. Tables along kitchen wall. D. Table on diagonal. E. Built-in alcove furniture. F. Table (2'6" x 6'6") for three-bedroom units. G. Table 4' in diameter. H. Table 4' in diameter with three extension leaves. J. Serving table (1'6" x 3'6"). K. Sideboard (1'9" x 4').

The principal problem of bedroom furniture is the bedmaking process. This chore must be done seven days a week and it creates a heavy housekeeping burden unless it can be done simply. If beds can be made up without moving them, as in Figure 9-A, it means not only less physical effort but less wear and tear on the bedstead, less abrasion of the floor surface and of rugs. Such liberal spacing of twin beds may not be possible, but anything less is a compromise. Diagrams B to F inclusive indicate the necessary movement of furniture in bedmaking for the arrangements shown. In B four inches must be allowed between beds for the overhang of covers. C and E illustrate what happens when furniture fits in too tight between end walls. If any pieces occupy the positions to which beds are moved, they too must be moved.

Twin studio couches are frequently used for girls and boys who occasionally have guests of their own sex overnight. They are an excellent device for this purpose but when opened up take considerable room. F.

Double-decked bunks are used to conserve floor space in small bedrooms (see Figure 10). Children enjoy them immensely since they like to climb—but poor mother! If freestanding, the makeup must be from two sides with a short ladder; if against the wall, the upper bunk requires the agility and skill of a Pullman porter.

B, C and D show devices used in "efficiency" apartments to conceal beds when not in use. B is the ordinary type of drop bed in a closet. It is a miserable contraption. The doors cannot be closed when the beds are in use and the whole room has a messy appearance. Further, the occupants have the feeling of sleeping with their heads in a hole. The arrangement shown in C is much preferable. Beds are mounted on pivoted flush panel doors. Whether the beds are in use or not, the wall is continuous and the room looks orderly. D shows a rolling bed that slides into a recess, the foot board forming a wall panel. What happens to the pillows? It requires additional ceiling height, is expensive and difficult to clean. Its use should be avoided.

Figure 9 (opposite page top). Arrangement of beds. A. Twin beds with aisle involves no moving of beds to make them up. B. Twin beds without aisle. C. Insufficient length. D. Twin beds with window between them. E. Insufficient length. F. Two arrangements for double studio couch.

Figure 10 (opposite page bottom). Space-saving beds. A. Double-decked bunks, against the wall and free-standing. B. Drop bed in closet. C. Drop beds on pivoted doors. D. Disappearing sliding bed.

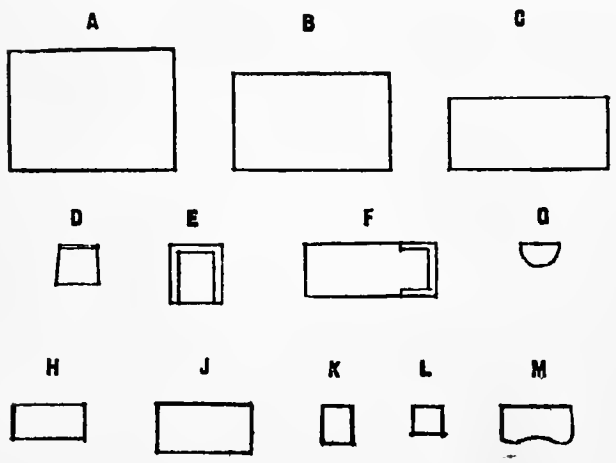
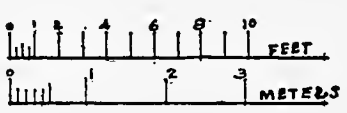
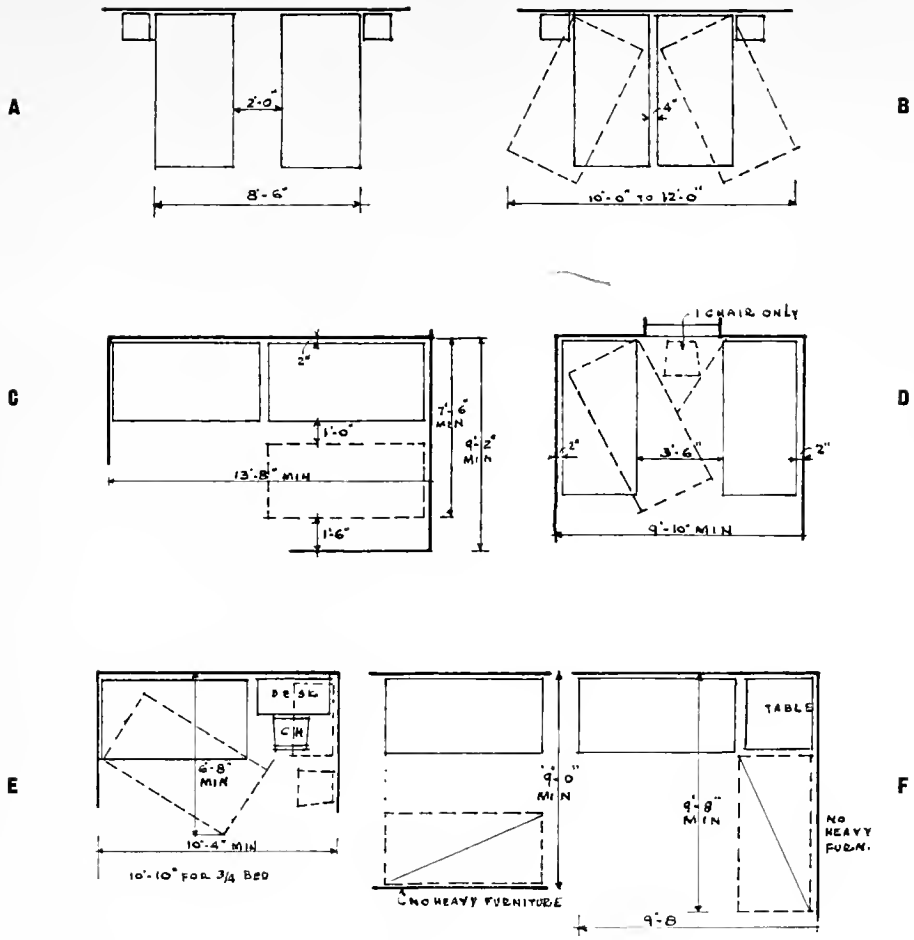


Figure 8. Bedroom furniture. A. Double bed (4'10" x 6'10"). B. Three-quarter bed (3'6" x 6'6" to 4'6" x 6'10"). C. Single bed (3' x 6'6" to 3'2" x 6'8"). D. Small chair (1'6" x 1'6"). E. Small armchair (2'2" x 2'6"). F. Chaise longue (2'4" x 5'6"). G. Dressing table stool (1'6" x 1'1"). H. Small chest (1'6" x 3'). J. Large chest (2' x 4'). K. Bedside table (1'1" x 1'7"). L. Bedside table (1'2" x 1'2"). M. Small dressing table (1'6" x 3').




A
2'-0"
8'-6"
B
4"
10'-0" TO 12'-0"
C
2"
7'-6" MIN
1'-0"
13'-8" MIN
9'-2" MIN
1'-6"
D
1 CHAIR ONLY
2"
3'-6"
2"
9'-10" MIN
E
DESK
CLH
6'-8" MIN
10'-4" MIN
10'-10" FOR 3/4 BED
F
9'-0" MIN
TABLE
9'-8" MIN
NO HEAVY FURN.
NO HEAVY FURNITURE
9'-8
0 1 2 4 6 8 10 FEET
0 1 2 3 METERS
A
3'-0" MIN
1'-0"
8'-6" MIN
3'-0" MIN
1'-6"
B
6'-0"
2'-6"
HINGED
4'-6" x 6'-8"
C
8'-4"
2'-6"
PIVOT
7'-0"
D
DRESS'G CLOS
9'-0" MIN

Rooms

In our consideration of rooms, no attempt is made to illustrate all possible variants of living rooms, dining spaces, etc., nor to present rooms for other uses than those common to all households, since housing projects of necessity must include only rooms which meet average needs, with enough flexibility of use to accommodate reasonable variants from the norm. Where possible, the illustrations are grouped to present a principle or theme of planning practice.

living rooms

The living room is the principal area of contact with visitors. The housewife wants it in order at all times; hence it should have the following characteristics where possible:

1. It should be near the entrance of the dwelling. In inverse order of privacy the logical succession of rooms is, foyer, living room, dining space, kitchen, bath and bedroom.
2. If possible, it should not be a passage to other rooms.
3. If it must allow passage to bedrooms, an alternate way through the kitchen or dining space is desirable.
4. If used for sleeping, either for occasional guests or family members, it should have a single point of entrance.

Figure 11 indicates six different circulation patterns common in housing. In each case, circulation is indicated in broken line, and the shaded circle shows the probable conversation center. Of the six, only A affords full privacy for sleeping. B and E are frequently found in flats; D shows the worst type of circulation. C and F are acceptable compromises. F permits sleeping in the living room without undue disturbance, since it affords a by-pass through the kitchen and dining space to the bedrooms.

Although passage through the living room to reach the bedrooms is generally inconvenient, it is not too objectionable in one-bedroom units where an occupancy of only two persons may be assumed and overnight guests are likely to be infrequent. Such is the case in urban elevator apartments, especially of the corridor type. These buildings are usually on expensive land. The aggregate of additional area required to provide privacy of access to the bedrooms sometimes makes it financially impossible to do so. The same problem arises in narrow row houses, where a full entrance hall on the first floor would take up too large a percentage of the lot width.

It is surprising how often we find dwellings, all with the same size living room, regardless of whether there are one, two, or three bedrooms or whether dining in the living room is contemplated. Obviously it must be possible for all members of the family to gather there for social contact and sometimes for dining, nor should visitors be expected to sit on the floor or

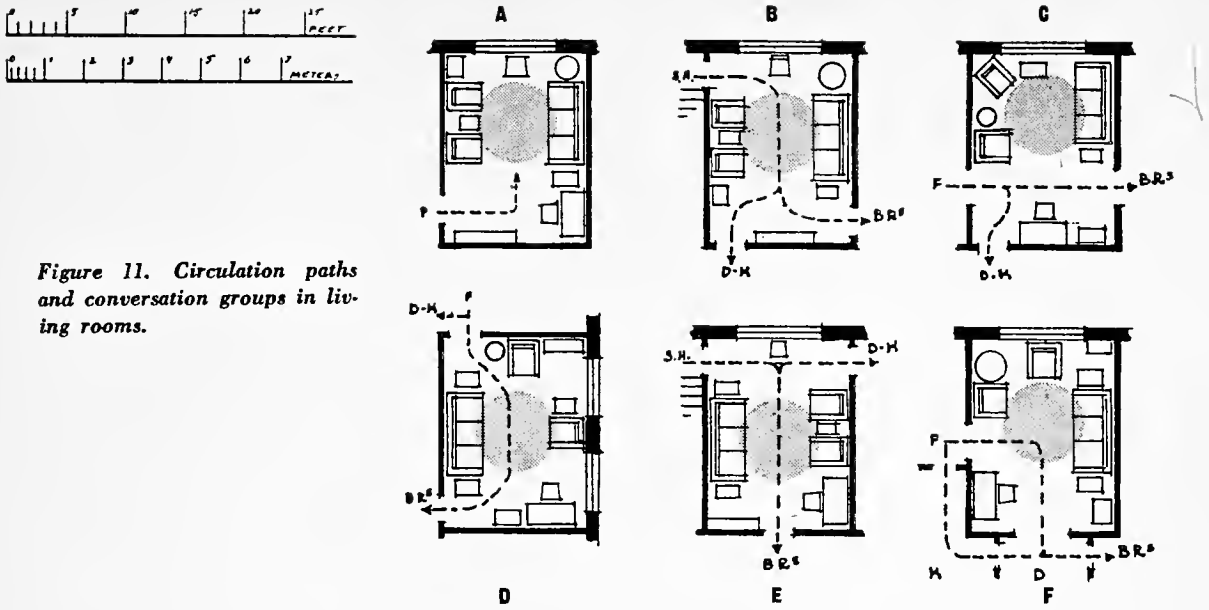
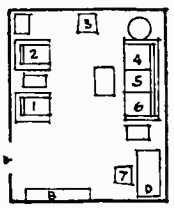
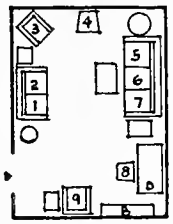


Figure 11. Circulation paths and conversation groups in living rooms.

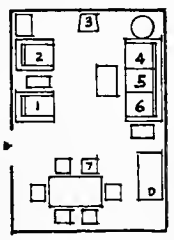


Living room, without dining area in one- or two-bedroom unit. 200 sq. ft., 18.6 sq. M.

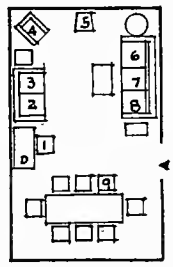


Living room, without dining area, in three-bedroom unit. 219 sq. ft., 20.4 sq. M.

Figure 12. Living room area as affected by number of bedrooms.



Living room, with dining area, in one- or two-bedroom unit. 231 sq. ft., 21.5 sq. M.



Living room, with dining area, in three-bedroom unit. 263 sq. ft., 24.4 sq. M.

the radiator. The best way to determine size is to make a furniture layout assuming the number of persons in the family plus two visitors. This approach is illustrated in Figure 12. The drawings presuppose two family members for each bedroom. For a one-bedroom unit, the room could conceivably be a trifle smaller, but since a small family is likely to have almost as much living room furniture as one having two bedrooms, the area has been shown identical for both cases. Note that in both instances the area added to accommodate dining is less than the area occupied by the table and chairs. We may infer that with proper planning, dining in the living room is economical of space.

The size of the living room is also affected by rental level. Whether the rental is low or high there must be room for the essential furniture. As we go up in the rental scale, economics, if nothing else, forces us to provide greater amplitude of space and room for furniture which, if not essential, is not unusual. Figure 13 illustrates this point. Here we have assumed a family of four. A shows essential furniture. In B and C the same pieces are shown and additional furniture is shaded.

There is an infinite variety of shape and size of living rooms; square, round, irregular; a fireplace along a wall or teepee fashion in the middle; sometimes they are invaded by outcroppings of rocks or the trunks of giant oaks. It would be pointless to discuss all of these. What we have shown in rectangular pattern merely presents certain basic considerations.

dining space

The tendency toward reduced dining space has already been noted. This is all to the good with one proviso: that dining be possible with ease and enjoyment. If table room or the surrounding space is too cramped, eating becomes a mere physical act, to be performed as quickly as possible, and the pleasure of dining has disappeared. It is a true pleasure of which no one need be ashamed; in fact, for many it is an important ritual. There is such a thing as going too far toward a routine of eating canned foods.

There are five principal ways of providing dining space: 1. in the living room, 2. in the kitchen, 3. in a dining room, 4. in a dining alcove, 5. in a dining foyer.

We have discussed 1 above; 2 will be considered under "kitchens." Here we are concerned with 3, 4, and 5. By "dining room" we mean a space separated or separable from the living and cooking areas. A dining alcove is a space recessed from another room into which it opens. A dining foyer is a widening of circulation space, supposedly ample for chairs and tables.

Dining Rooms are built less frequently than formerly, but they still have their place in dwellings planned for large families whose meal times involve many dishes and much consequent clatter. They serve a second purpose in affording an additional social center for families whose members vary markedly in age. Figure 14 presents three examples of small dining rooms such as are not infrequent in row houses.

Dining Alcoves should always adjoin the kitchen. To conserve outside wall space, the two areas are most often arranged side by side in depth. Here the question arises, which of the two should enjoy the window. The alternatives are shown in Figure 15, A and C.

Some building codes require that the kitchen have window ventilation, and many persons prefer this, since preparation of meals and cleaning up consume more time than eating. The opposite arrangement has certain

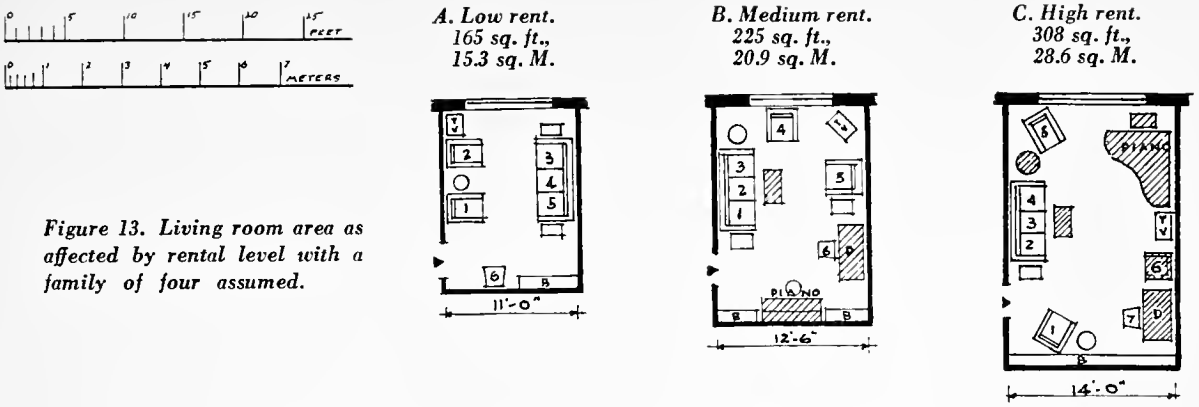


Figure 13. Living room area as affected by rental level with a family of four assumed.

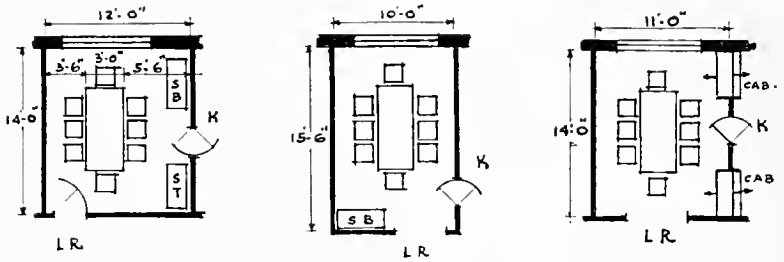


Figure 14. Three small dining rooms.

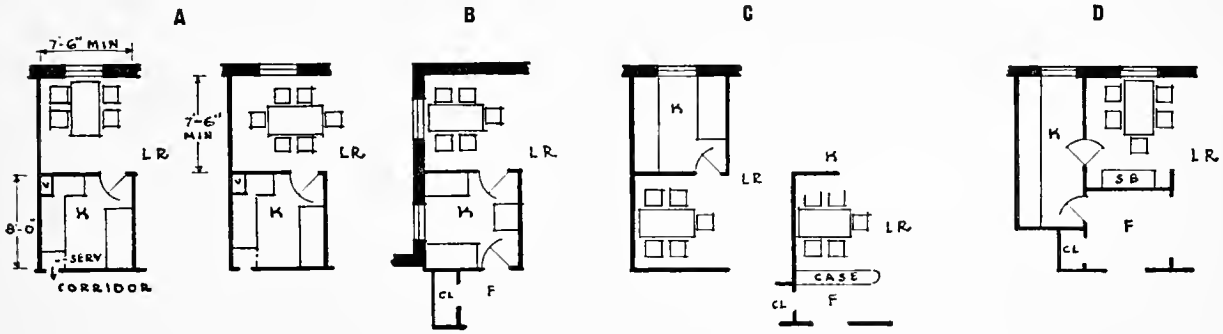


Figure 15. Dining alcoves.

advantages. If the dining area is at least 7′ 6″ square, the table can be set either way and for additional seating can be extended into the living area (Figure 15-A). Note that for convenience of serving it is better to have the kitchen door off-center, even though this requires greater area. The inside kitchen must be ventilated artificially. Its use in walk-up apartments is open to question since although vent and fans may be installed, the management is tempted to shut off the fan to save current. If two of three apartments on a stack are vacant or the occupants on vacation, he will be running the fan for a single family. Such things do occur. The interior kitchen is the indicated scheme in serviced apartment hotels, where deliveries and waste removal are done from a servidor off the corridor (see A). If economy of outside wall length is not a compelling consideration, both kitchen

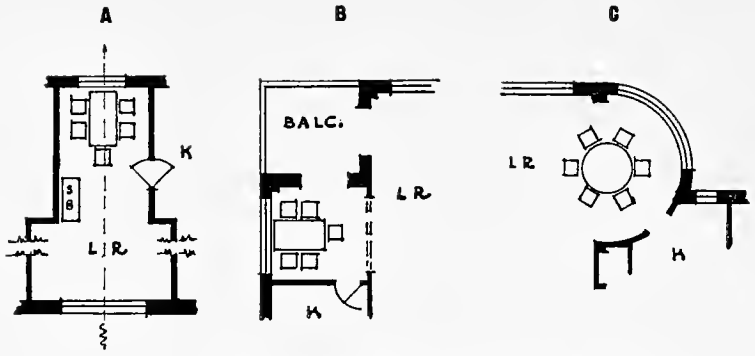


Figure 16. Dining alcoves. B: Mayer & Whittlesey, architects. C: Emery Roth & Sons, architects.

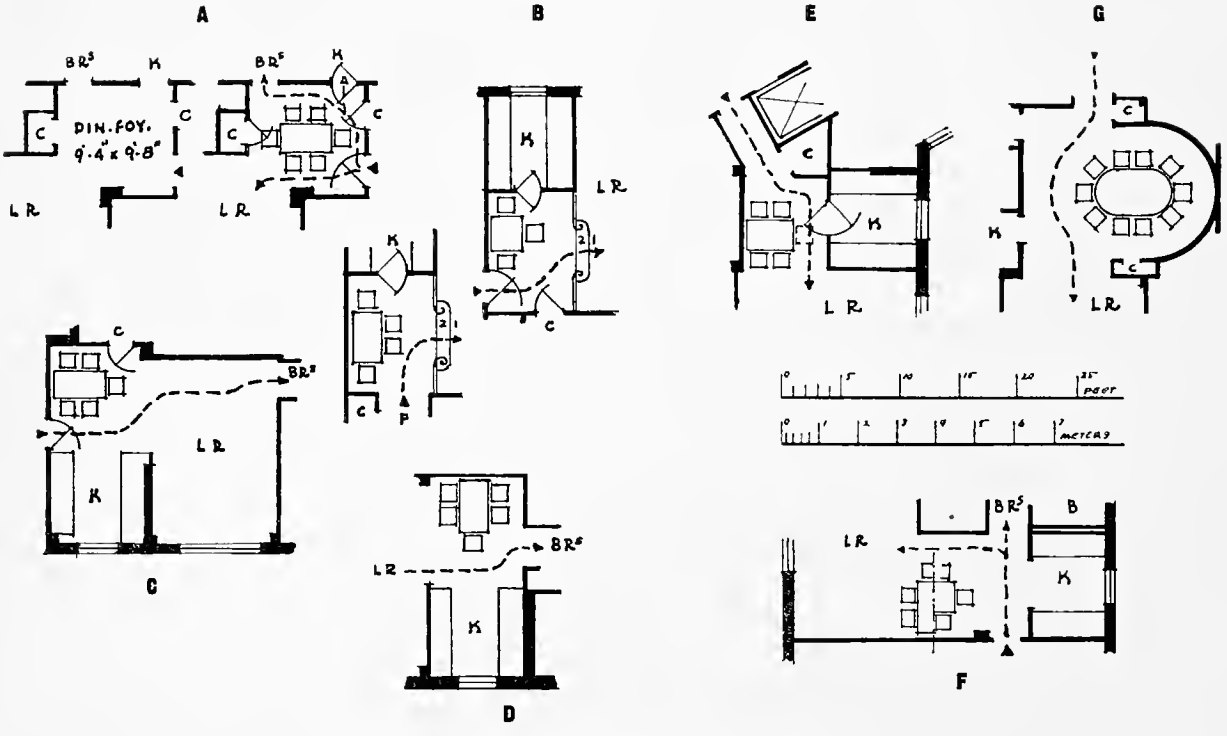


Figure 17. Dining foyers. G: Emery Roth & Sons, architects.

and alcove can have access to daylight (B and D). Figure 16-A shows a highly desirable arrangement of the alcove opening into the end of the living room with through draft. B and C are examples from high-rent elevator buildings; both afford a high degree of amenity.

Dining Foyers are the favorite gimmick for getting extra room count in public housing projects. Figure 17 shows examples (C, D, E, and F) from executed projects. With tricky draftsmanship they can be made to look good, but for our money only D and F are even tolerable. Of course if not even faking the furniture will make a dining foyer appear adequate, the simplest thing is not to show it! In A we have to the left the space as it is shown on the rental plan. It appears to be sizable. To the right we see it in use. The table cannot go against any wall and blockades all circulation. This again is from a real building. B shows what is called a "dining gallery." We don't know what public enemy invented it, but he must have had a Hollywood complex. The space is badly cut up and at best only a few people can use it for dining. If the steps were omitted and the space open to the living room it might be tolerable. G shows a spacious dining foyer in a luxury apartment. It is fair to conclude that the dining foyer is a questionable feature except in rare cases; any of the five other methods is preferable.

kitchens

It is hardly necessary to emphasize the importance of the kitchen in our daily life; it should be noted, however, that as we descend the scale of income, it assumes greater and greater importance, since eating out is less frequent. Indeed, for many the kitchen is the social center of the home.

The primary functions of a kitchen are food preparation, serving, and subsequent clean up. To these may be added eating, laundry work, and child care. These supplementary uses obviously affect the size of the room.

Doors shutting off the kitchen from dining or living space are frequently omitted. This may be acceptable if there is an exhaust fan to void the heat and odors of cooking. Unless we are willing to tolerate the dissemination of odors, the omission of the door as a matter of economy is unwarranted. The exhaust system usually costs more than the door. A view of unwashed dishes, pots, and pans from the dining space is hardly a treat for guests. If the kitchen adjoins the living room, a door is essential, especially if the latter is used for sleeping because escaping gas can cook somebody's goose even if it is not burning.

The position and swing of kitchen doors affect the planning. There may be a single door to the hall or dining space, two or even three where there is direct entrance to the kitchen from a service stairs or in row houses. Architects can readily adjust any of our diagrams to the need for additional doors in the kitchen.

As in our study of other rooms, we have sought to emphasize adequacy, rather than minima.

theories of kitchen operation

Many analytical studies of kitchen operation have been made, almost always with the objective of saving steps and arm motions and consequently reducing fatigue. Sometimes they are based on questionable premises; thus, we are told that on a kitchen sink, a single drainboard should always be to the right of the basin, since that is the easiest way for a person to wash dishes. Perhaps it is for right-handed persons, but a sizable proportion of men and women are left-handed. Following this rule creates difficulties when the sink is in a right hand corner making it hard for a second person to work at the sink. If father can conveniently dry the dishes as mother washes them it will save her much more effort than might conceivably be caused by a left-handed drainboard. (See Figure 19.)

Most of these studies are based on a thoroughly logical sequence of storage and operation, so that food preparation follows an assembly line course along a counter top, at the end of which it is ready to serve. They are likely to result in a diagram similar to Figure 18-A.

There is certainly no objection to the fixture sequence shown; it is good, but the simple operation indicated does not begin to tell the story of what really happens, nor does it give a universally applicable method. There are three reasons for this conclusion.

1. The process stops at the moment when food reaches the dining table, completely ignoring what happens subsequently. What is shown also omits several important steps in food preparation. In Figure 18 (B, C, and D) we have attempted to show the complete kitchen process assumed in A. Steps saved at one point are likely to be lost at another.

2. The processes of cooking are not necessarily simultaneous; a roast may require two hours cooking and a vegetable ten minutes, they are successive operations, sometimes without any continuity.

3. Cooking is an art, not a mechanical process, and every good cook has developed a highly personal method of working, which may not at all fit into a preconceived pattern. What architect has not been told by a woman client that his kitchen layout is all wrong and that he ought to have a woman design it. All she really knows is her own personal way of doing things, but basically her objection is justified because it is the architect's job to design the kitchen for *her*.

In the writer's opinion we cannot predicate any operational sequence that means much; what is important is that the operational *area* be reasonably small with everything not more than one or two steps from a work center. One application of this theory is shown in Figure 18-E.

kitchen fixtures

It is not essential to discuss kitchen fixtures in detail, but a few comments about matters frequently forgotten are in order.

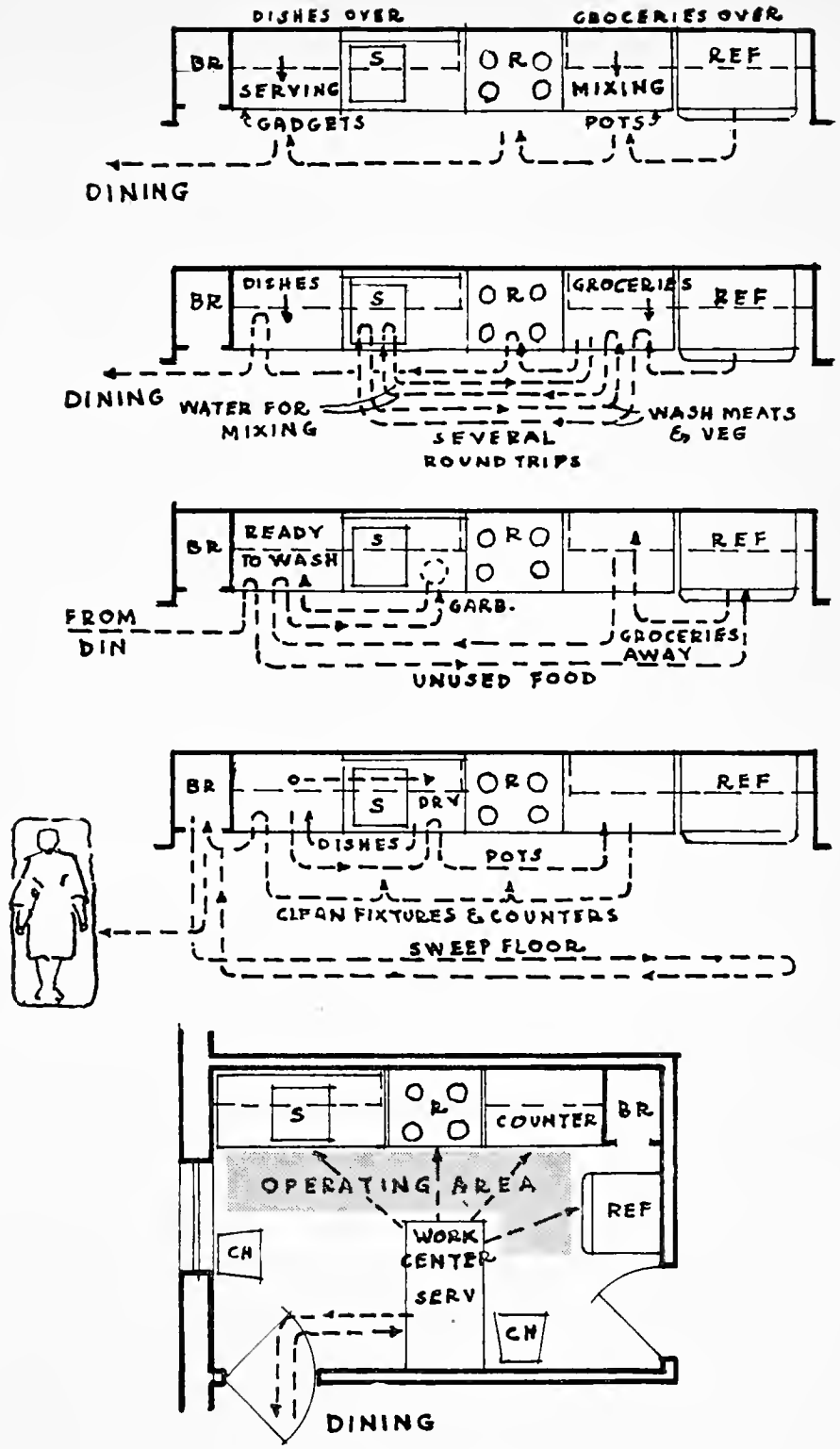


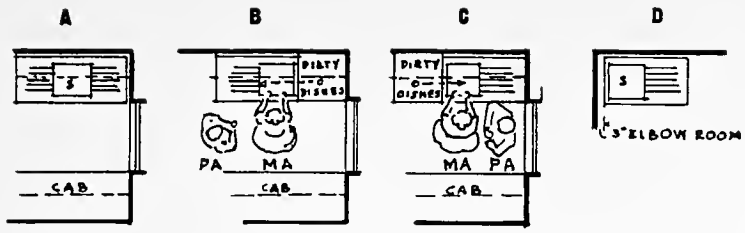
Figure 18. Kitchen operation: theory and reality.

Sinks Drainboard position has been mentioned. Where space is limited, watch out for elbow room (Figure 19-D). For medium and low rent projects enameled iron tops and drainboards are the safest bet. If synthetic materials are used, they must be tough enough not to be ruined by careless tenants. Metal sinks are excellent, but some types of metal show every finger mark.

Ranges Early gas ranges had open burners on top and ovens below, much like the old coal and wood stoves. Then someone thought of the cabinet range which lifted oven and broiler to a convenient height. In recent times the cult of the long straight counter top has driven them down again, a sad sacrifice of convenience to an esthetic idea (Figure 19-E). Every range is a fire hazard, most so when the open burners are close to an end wall or window or when lack of space requires a storage cabinet above (Figure 19-G). In "snack kitchens" located in a recess or closet, electric ranges are preferable because of possible escape of gas from other types.

Refrigerators This is the one type of fixture which can most readily be separated from others and in a small kitchen can be located wherever space is most readily available. However, it should not be placed next to the oven range. True it is insulated, but insulation merely retards the transmission of heat; it does not prevent it. Minimum sizes of refrigerator: for one-bedroom unit, 4 cubic feet; for two-bedroom unit, 6 cubic feet; for three-bedroom unit, 8 cubic feet. In some parts of the United States it is customary for the tenant to supply his own range and refrigerator; in such areas and in houses for sale, it is best to plan these fixtures at free ends of cabinet counters so that all usual sizes can be accommodated; otherwise at least 40″ of length should be allowed.

Kitchen Cabinets No housekeeper ever complained of having too much room in kitchen cabinets. Unfortunately cost and available space usually limit the length of wall and base cabinets that can be installed. The problem is to design the cabinets so that a maximum of live storage space is available. In wall cabinets this means space that a short woman can reach without climbing. Experiment has shown that the highest she can reach readily is from 5′10″ to 6′2″ above the floor. (1.79 M to 1.87 M) This fact is usually ignored in commercially produced cabinets, which ordinarily are divided in height into three equal spaces. The center diagram in Figure 20 shows that she can reach only two shelves from the floor. Equal spacing is not advisable, since dishes and packaged groceries vary in height. At the left we show a cabinet designed to make an additional shelf available, thus increasing the live storage space in a given length by 50%. The total linear feet of live storage shelving should be at least eighteen for one bedroom units and twenty-four for larger units (5.5 M and 6.7 M). Ordinary base cabinets have excessively high bottom compartments. This defect can be



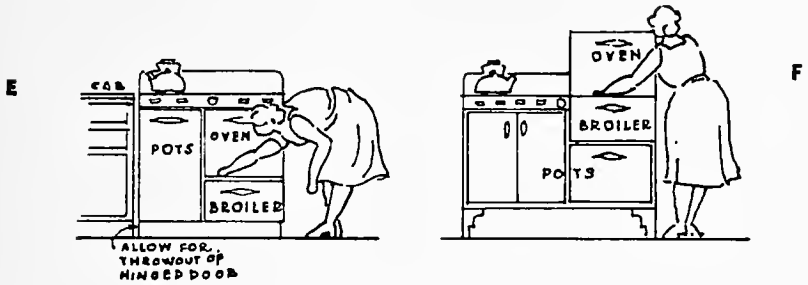


Figure 19. A. Best kitchen sink, works either way. B. Good arrangement. C. Poor arrangement. D. Insufficient elbow room. E. Modern labor-saving range. F. Old-fashioned drudgery. G. Range at window. H. Refrigerator in corner.

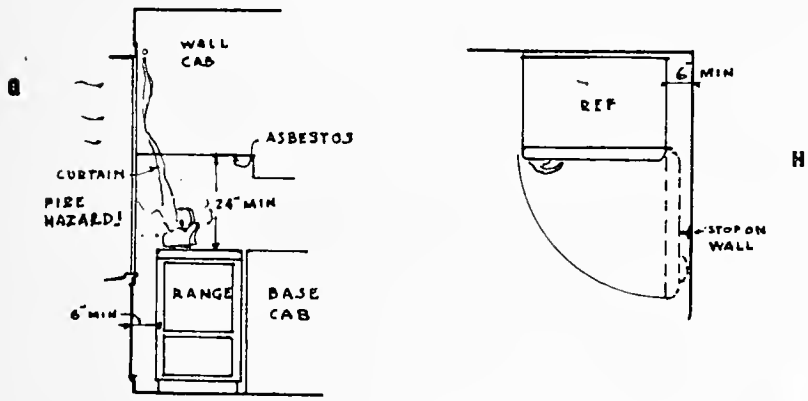
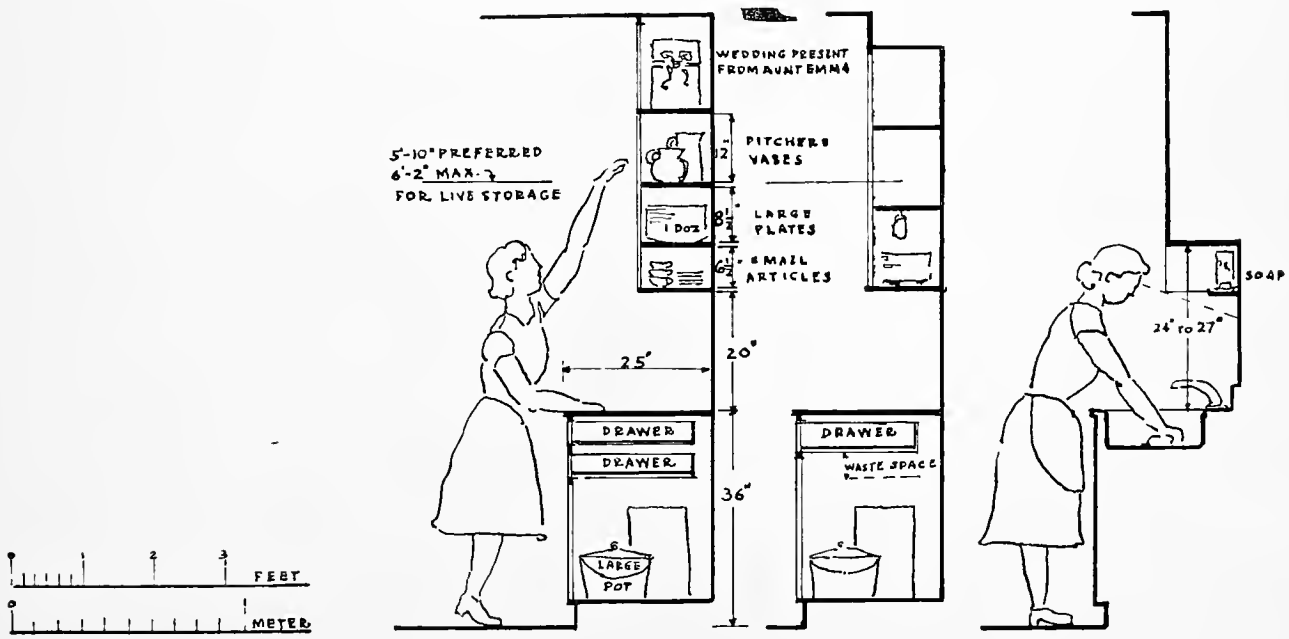


Figure 20 (below). Kitchen cabinets and sinks. Improved model with three shelves of live storage (left) and average commercial cabinet with two shelves of live storage (middle). Sink (right).



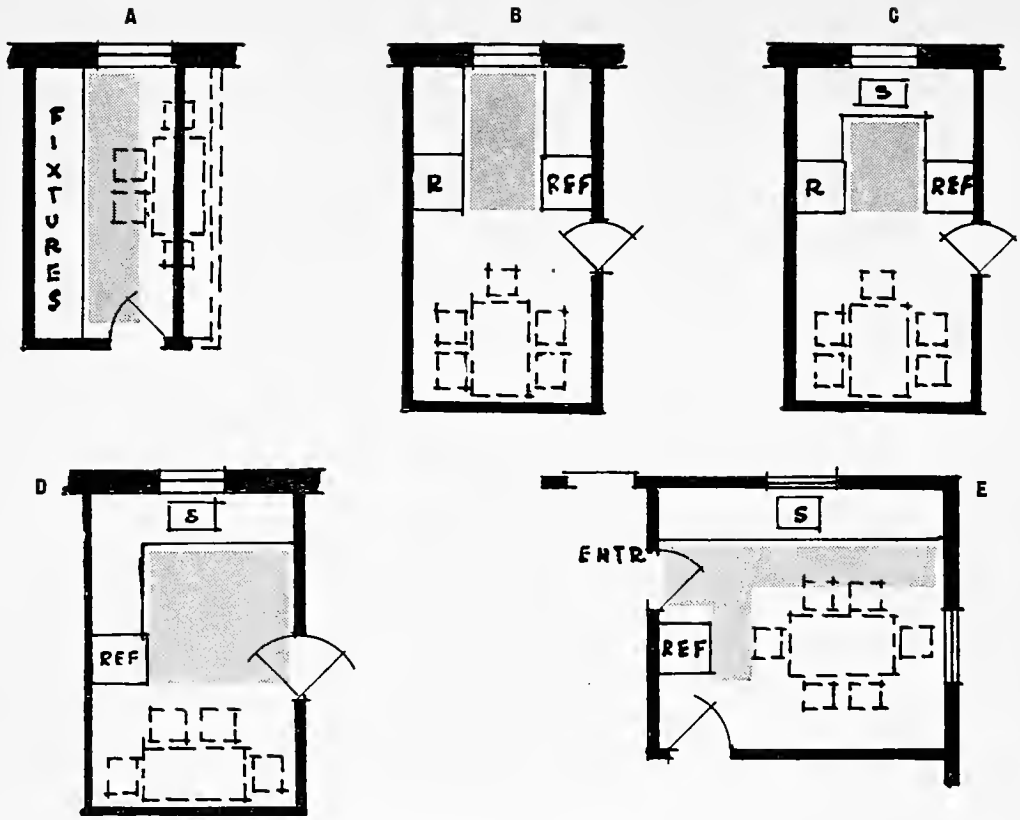


Figure 21. Basic types of kitchen layout. A. Single strip. B. Double strip. C. U-shaped. D. L-shaped. E. Living-kitchen.

remedied by an additional shelf or drawer. Over the sink the wall cabinet should not interfere physically or visually with the person using it. We have shown a short woman, but both women and men come in larger sizes.

Broom and Laundry Lockers There are two schools of thought about the location of the broom closet if only a single one is possible. Some maintain that it should be as nearly as possible at a central point of the entire dwelling unit, others that it should be in the kitchen. We favor the latter because the kitchen is or should be swept three times a day and because carpet sweepers and vacuum cleaners are brought to the kitchen for emptying. Take your choice, but in either case make it large enough, especially if laundry work is done at home. It may have to accommodate any or all of the following: broom, floor mop, dust brush, carpet sweeper, vacuum cleaner, dust cloths, ironing board, cleaning materials, and wrapping paper.

common types of layout

Figure 21 shows five varieties of kitchen layout in common use. Advantages and disadvantages of each type are noted below:

Single Strip Advantages: requires small outside wall length; all supply lines in one wall; door may be located at several points. Disadvan-

tages: long operating area (shaded); not a good shape for dining three times a day unless very wide.

Double Strip Advantages: short operating area; no interference with dining; better if tenant supplies range and refrigerator; better for sewing, study or games. Disadvantages: interference more likely if two are working; washing machine more likely to blockade passage.

U-Shaped Advantage: small operating area. Disadvantages: window access difficult; counter space gained at windows lost in blind corners, requires as much area as B; harder for two to work; longer run of sink supplies and waste.

L-Shaped Advantage: operating area larger but easy to use. Disadvantages: window access difficult; one blind corner; as large as B, but less advantageous in several respects.

Living-Kitchen Advantages: greater flexibility of use; better as family social center. Disadvantages: more space to keep clean: long operating area.

Snack Kitchens (See Figure 22.) Housing agencies have consistently stressed the importance of the kitchen in home life. Nevertheless, they have sometimes permitted the use of "strip kitchens" even in units having two bedrooms. These are something like what is shown in A. They are entirely inadequate for families of more than two; even then they are extremely inconvenient because of lack of counter top. A hinged cover on the range serves no purpose, for it is needed most when it is not available. B shows the type of thing that dwellers in expensive slums have to put up with. In both A and B the preparation of a full meal is a stunt worthy of the late Houdini. All such kitchenettes present the danger of escaping gas; hence electricity is preferable for cooking, and architects should verify that the refrigerant is not toxic.

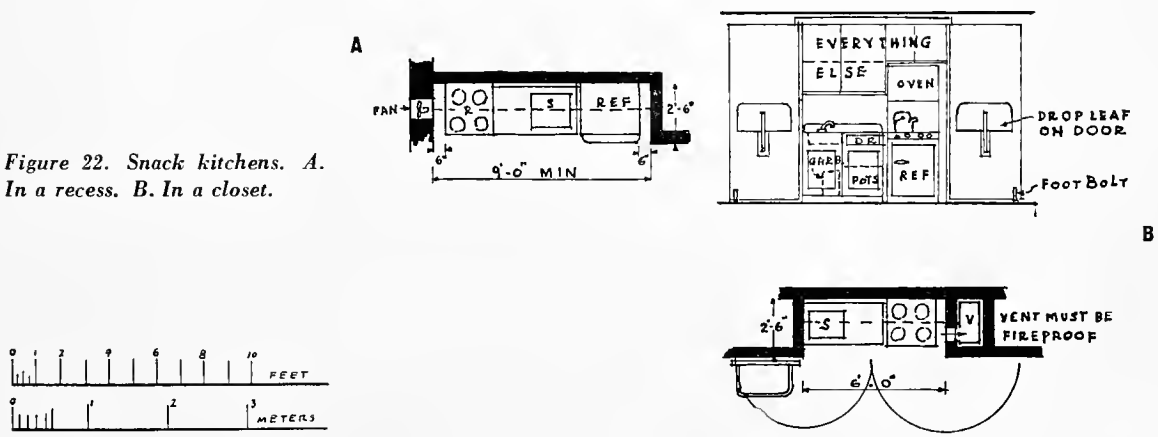


Figure 22. Snack kitchens. A. In a recess. B. In a closet.

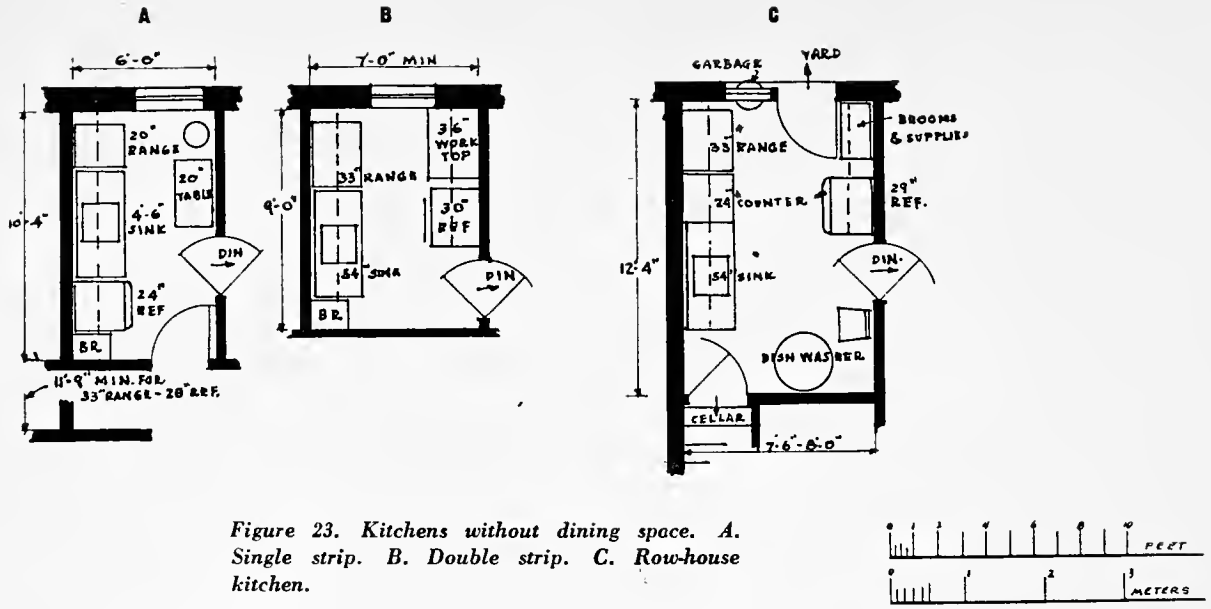


Figure 23. Kitchens without dining space. A. Single strip. B. Double strip. C. Row-house kitchen.

Non-Dining Kitchens are shown in Figure 23. The row-house kitchen (C) illustrates the difficulties encountered when a kitchen must have at least three doors and perhaps a fourth to utility closet next to the staircase. In the kitchen-laundry (see Figure 24-E) an attempt has been made to group the fixtures needed for these functions; thus cooking is still possible even though clothes are hanging from the ceiling rack. The laundry cabinet shown has room for the ironing board, brooms, and other cleaning materials.

Dining Kitchens (See Figure 24.) The limitations of the single strip kitchen as compared with the double strip are shown in A and B. Both use the same length of outside wall; the depth is greater in B, but the convenience of dining much greater. As shown, A is out of the question for three-bedroom apartments. To serve their need, it would have to be eleven feet wide. C shows an ingenious use of the "blind" space created at the re-entrant angle of a building. Dining and cooking are well separated, and there is ample space for both. A disadvantage is that the kitchen fixtures are visible from the entrance door to the living room. This problem has been solved admirably in D by a screening partition. Those going to bath or bedroom have not the feeling of passing through the kitchen, even though cooking odors may tell them it is there.

Total Area of Public Rooms (Living room, dining, and kitchen) A number of years ago the Rental Housing Division F.H.A. made a study of the total floor space required for these three areas, with the following variants considered: dining in the living room, the kitchen, or in a separate space; two-bedroom and three-bedroom units. The total area ranged from 254 square feet to 310 square feet (23.6 square M to 28.8 square M). In all

cases, eating in the living room required the least area and a separate dining space the greatest. But the range of difference was only 19 square feet (1¾ square M). On the other hand, as between two-bedroom and three-bedroom units the range was 42 square feet (3.9 square M). The location of dining facilities is of minor importance in determining aggregate area; the principal factor is the number of persons housed.

baths The trouble with many bathrooms is that there is a bath but no room. Of course, the floor plan shows three fixtures and some space between, but all too frequently there is no adequate space for accessories, for heating equipment, and above all for two persons. Everyone prefers to have the bathroom to himself, but if husband and wife both work or if school children are rushing to get off in the morning, there is every advantage of having a

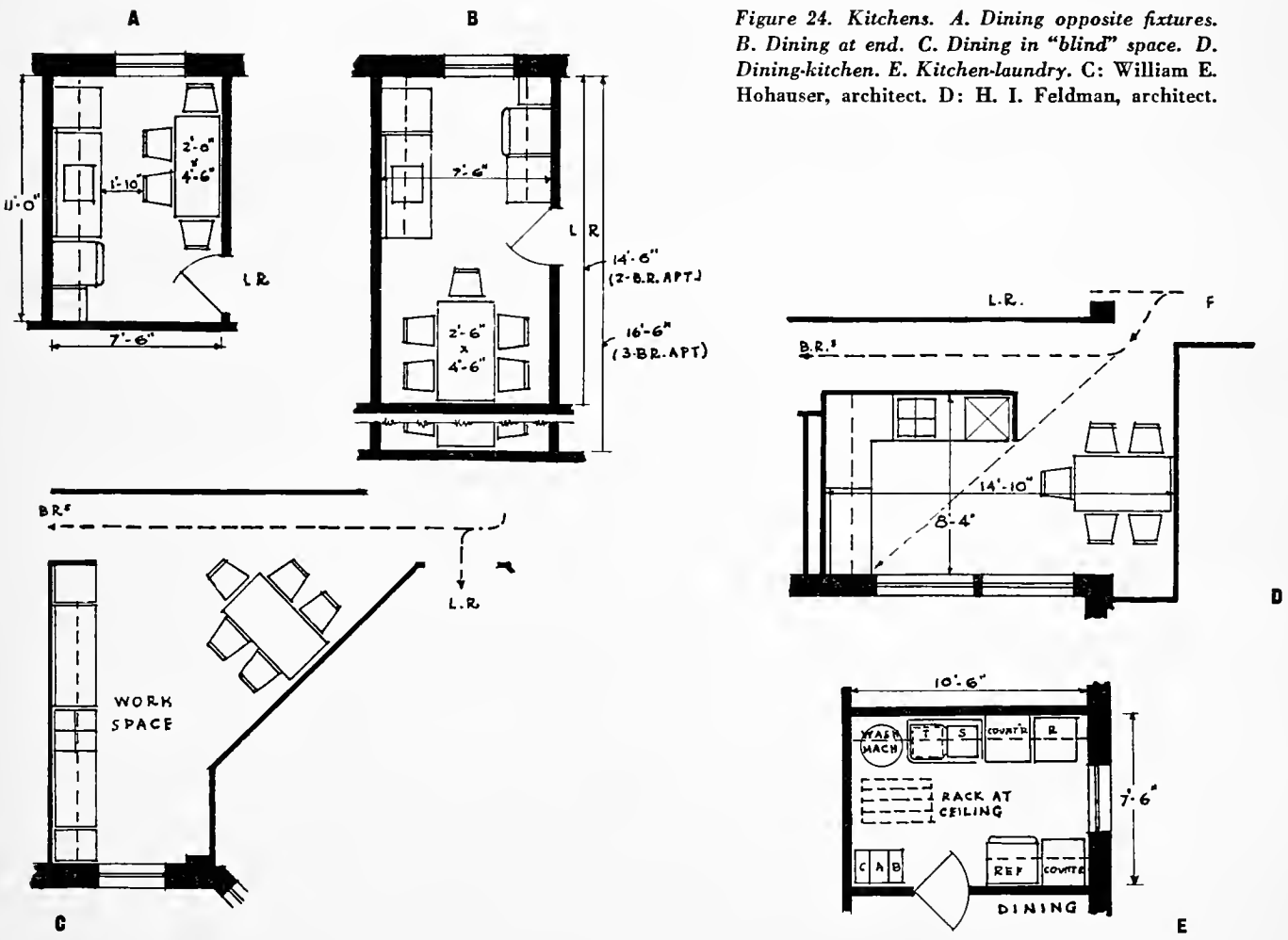


Figure 24. Kitchens. A. Dining opposite fixtures. B. Dining at end. C. Dining in "blind" space. D. Dining-kitchen. E. Kitchen-laundry. C: William E. Hohauser, architect. D: H. I. Feldman, architect.

room of sufficient size that two can use it at once. Since these conditions are most likely to arise in large families, minimal bathrooms should be avoided in dwelling units having more than two bedrooms.

Examples of layout In Figure 25, A to F, six bathrooms of usual types and three less common are shown.

A. Advantages: window access easy, tub built in three sides; radiator location good. Disadvantages: greater length of exterior wall; towel space only fair; roughing more expensive than E; convenient for only one person at a time.

B. Advantages: good window access; good towel space; good radiator location; exterior wall length not excessive; usable by two. Disadvantages: roughing and corner tub more expensive than E.

C. Advantages: roughing cheaper than B; excellent towel space; lots of room to move around. Disadvantages: cost of corner tub; if tiled, considerable added cost.

D. Advantages: smaller area than C; ample towel space; room for two. Disadvantages: roughing expensive; supplies for tub and shower at side; radiator location poor; window access slightly inconvenient.

E. This is the most common type of bath in housing projects, particularly in public housing. Advantages: least expensive roughing; comparatively small area; fair towel space. Disadvantages: window access difficult unless long handled casement operators are used; abrasion of enamel in tub caused by stepping in it to open window; draft across tub from window; waterproof curtain needed at window if there is a shower; use by two persons cramped.

F. Advantage: minimal size. Disadvantages: all.

G. A possible solution for large families, it does not have too great an area; it adds to cost, but is less expensive than two baths.

H. This design meets the needs of a family with an infant, greatly simplifying the problem of keeping the little rascal clean. Of course, baby will grow up, and there may not be another; still there are mother's nylons.

J. This is a bit of ingenuity the writer found in the West; object, two baths with one W.C. The great inconvenience is that the user of either bath may find the toilet door locked against him. Especially if tiled, this arrangement costs more than two full baths.

Interior Baths should be used only when, as in hotels, the perimeter wall must be used for as many rooms as possible. They are not objectonable if mechanically vented by an exhaust duct but only if there is reasonable assurance that the fan will be operated, that is to say, in elevator buildings. In low buildings, regardless of law, this may not be the case, and whereas the ventilation will sometimes work upward by gravity, there are atmospheric conditions under which it will go down. The use of skylights or

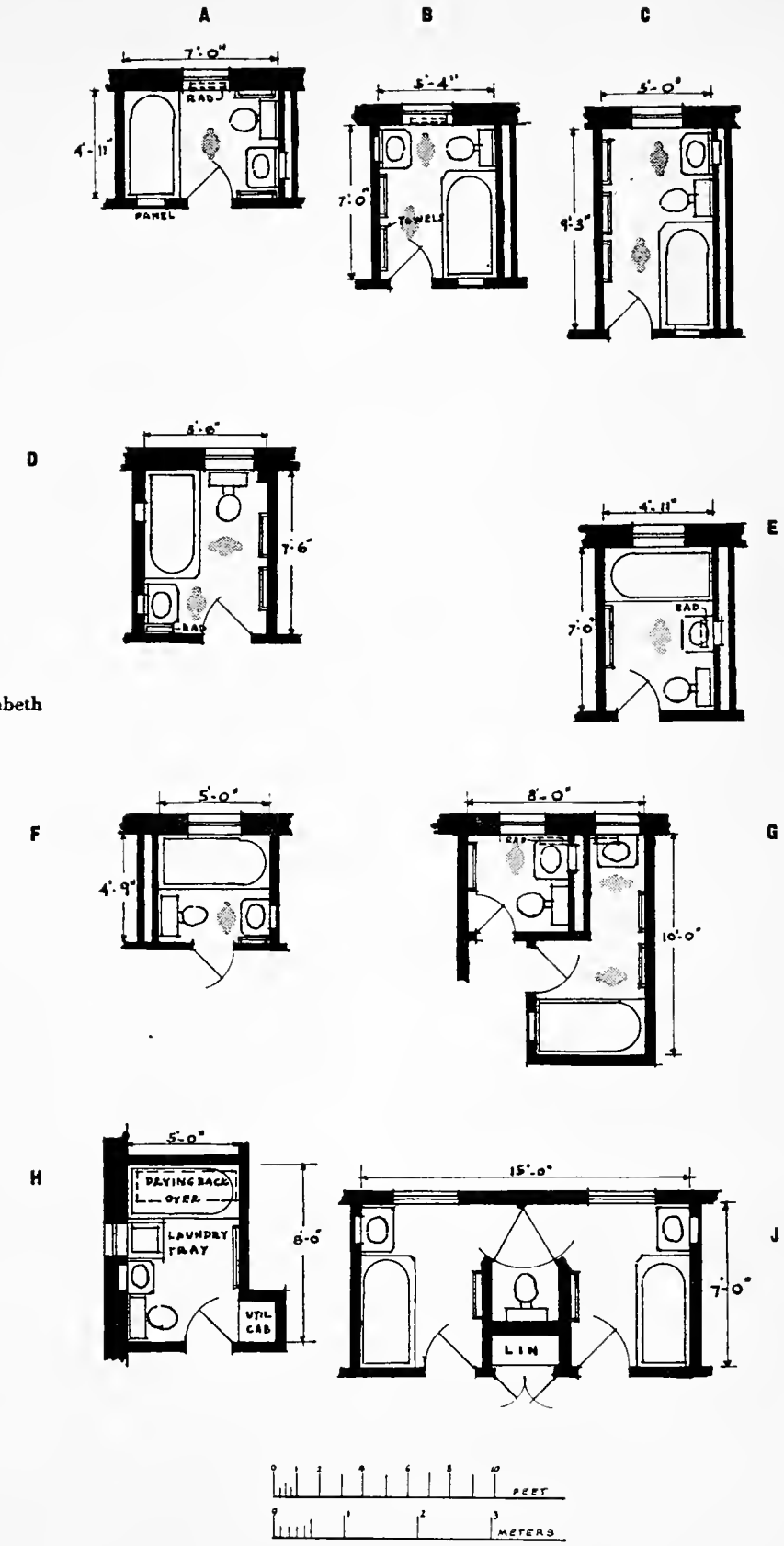


Figure 25. Baths. H: Elizabeth Coit, architect.

monitors to ventilate baths is questionable; both create drafts, skylights leak, and windows in monitors are difficult to operate and never washed except by rain.

Bathrooms of adjacent apartments on a common plumbing stack are to be avoided if possible because of noise transmission. Even visual privacy is diminished if the razor slots in medicine cabinets are opposite each other. If such things are unavoidable, insulation should be placed in the dividing partition so that at least airborne noises are muffled. Bathrooms with two doors are a nuisance; running around to unlock your bathroom door is vexatious.

Stall showers are no substitute for tubs in the only bathroom; bathing for little children and for old people is difficult; a shower over the tub satisfies most needs. If extreme economy in first cost is essential, the shower may be omitted but connections should be left for future installation.

Accessories. The necessary bath accessories must be installed by the owner in all rental housing; if they are not installed or if they are inadequate, the tenant will install what is missing and probably remove it when he vacates, leaving holes in the walls for the landlord to repair. The minimum necessary equipment is the following:

Two good-sized towel bars (note: bath towels require 12″; face towels, 6″; wash cloths, 4″)
One combination soap dish and grab bar at tub
One soap dish at lavatory
One tumbler holder
One toilet paper holder
One medicine cabinet

Include all of these, or else!

Heating. Where possible, radiators should be recessed; if not, the best location is under the lavatory to avoid contact with the naked skin. Exposed heating risers should be resorted to only if extreme economy is imperative; the heat cannot be regulated. If used, they must be located where no one will be burnt.

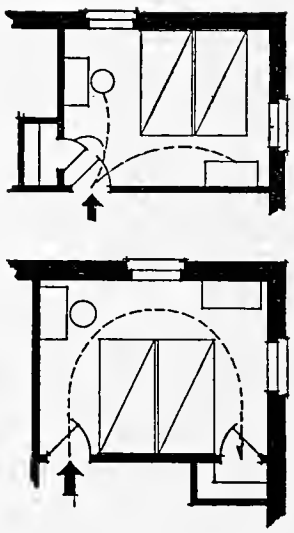


Figure 26. Good circulation (top) and poor circulation (bottom).

bedrooms

As with all other types of rooms, bedrooms should be studied with furniture and swing of doors shown. The two most important factors in a good bedroom layout are proper wall space for beds and simple and easy circulation (see Figure 26). Experience has shown that a bedroom less than 9 feet 6 inches (2.9 M) wide is seldom good for occupancy by two persons. That width will permit beds to stand at right angles to the side walls with proper space for passage at the ends. If the room works out well with beds in this position, it will usually permit several other arrangements. By the same token, rooms for two should be shown with twin beds. Some people

prefer double beds in spite of some obvious health objections, but they must not be used as a device to make inadequate space seem ample. In all cases the principal and the second bedroom in a dwelling should be large enough to accommodate comfortably two persons each. Additional bedrooms may be narrower if intended for a single occupant.

Where space and cost are limited, we find that bedrooms are just about sufficiently large to accommodate furniture and allow no space for living functions other than sleeping. These are what Elizabeth Coit has aptly called "Passage plus Furniture" bedrooms. They are not objectionable in themselves, but if all the bedrooms in a dwelling are of this type, the living room is likely to be crowded and disorderly. It is not always possible to have all rooms provide activity space, but at least one bedroom in units having two or more should provide it.

Figure 27 shows five examples of "Passage plus Furniture" rooms. They are patently the result of consideration of space limitations and not of living needs. Who will occupy the rooms? Of course we cannot tell in advance, but architects should study the needs of all possible types of family members so that they may be able to judge the potentialities of all rooms they show on a plan. What additional space is needed by husband and wife, with or without an infant in the room; by two boys or two girls; by two children of different sex; by teenagers; by elderly members of the family; by an adult son or daughter; by a lodger?

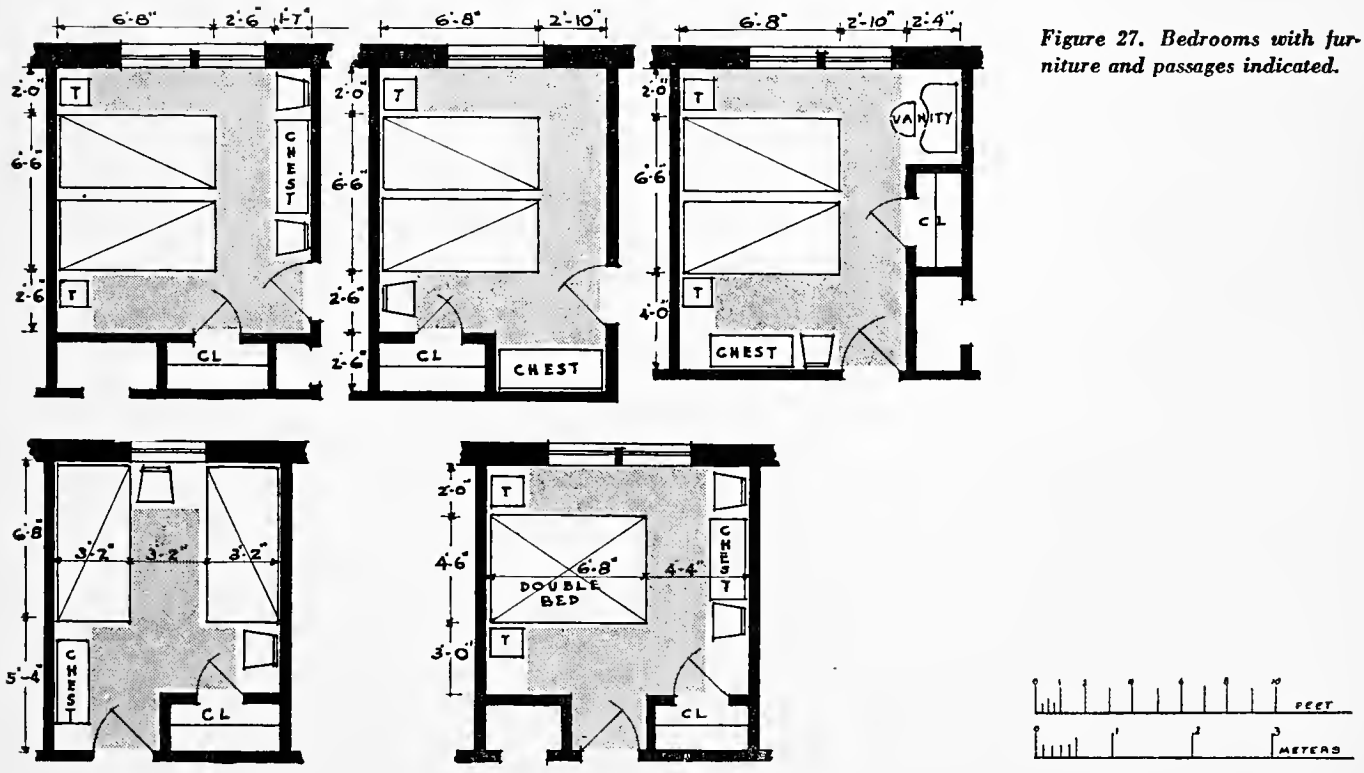


Figure 27. Bedrooms with furniture and passages indicated.

Figures 28 and 29 present eight studies with the assumption of a specific occupancy. They are not presented as models to be followed but are intended to illustrate a method of study. It is to be noted that greater livability of these rooms is not a matter of adding so and so many square feet but is the result of the better space distribution which the increased area permits.

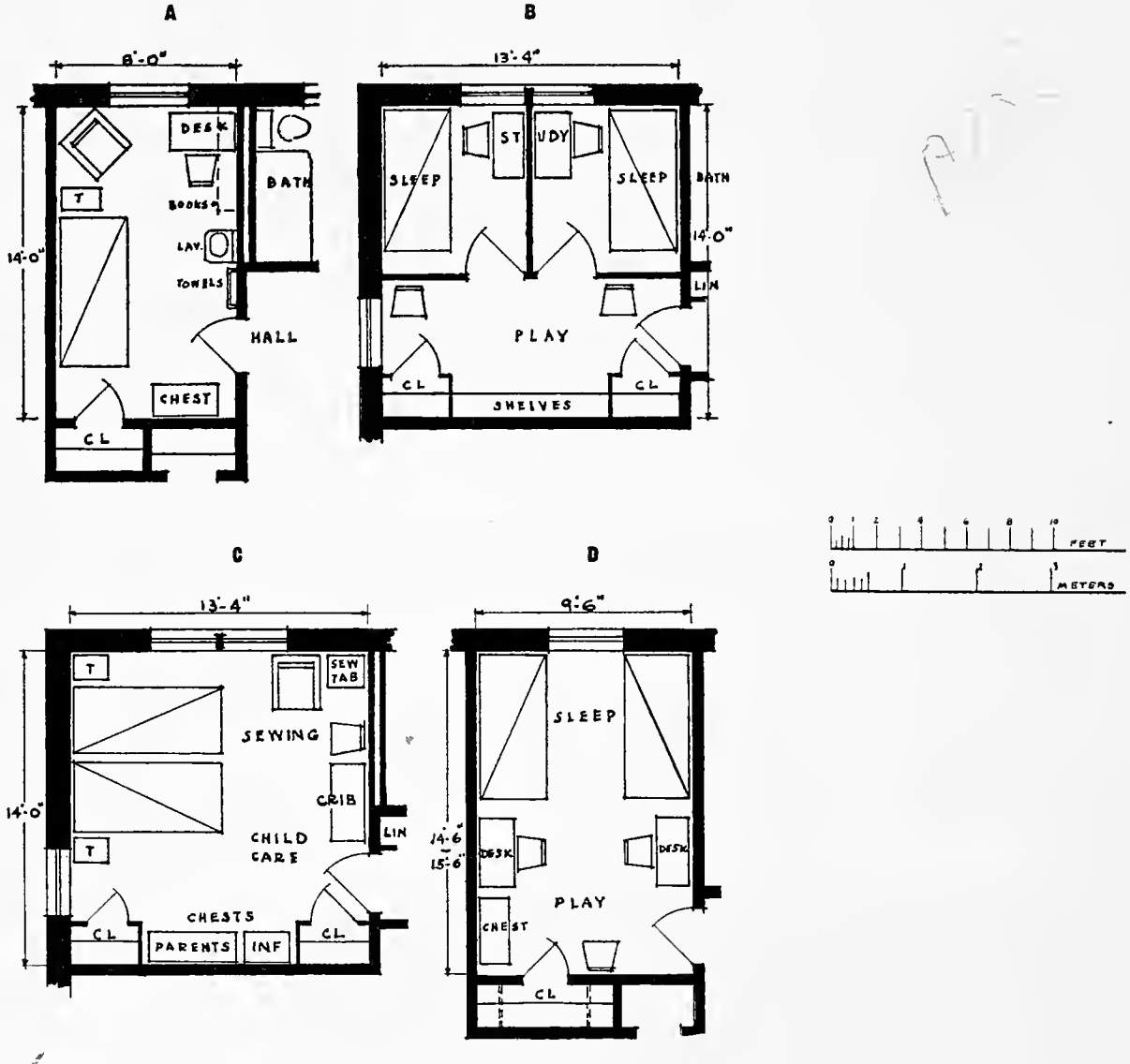


Figure 28. Bedrooms with activity space. A. Lodger's room. B. Corner room for two children, four to twelve years old. C. Corner room for parents and an infant. D. Room for two children, four to twelve years old.

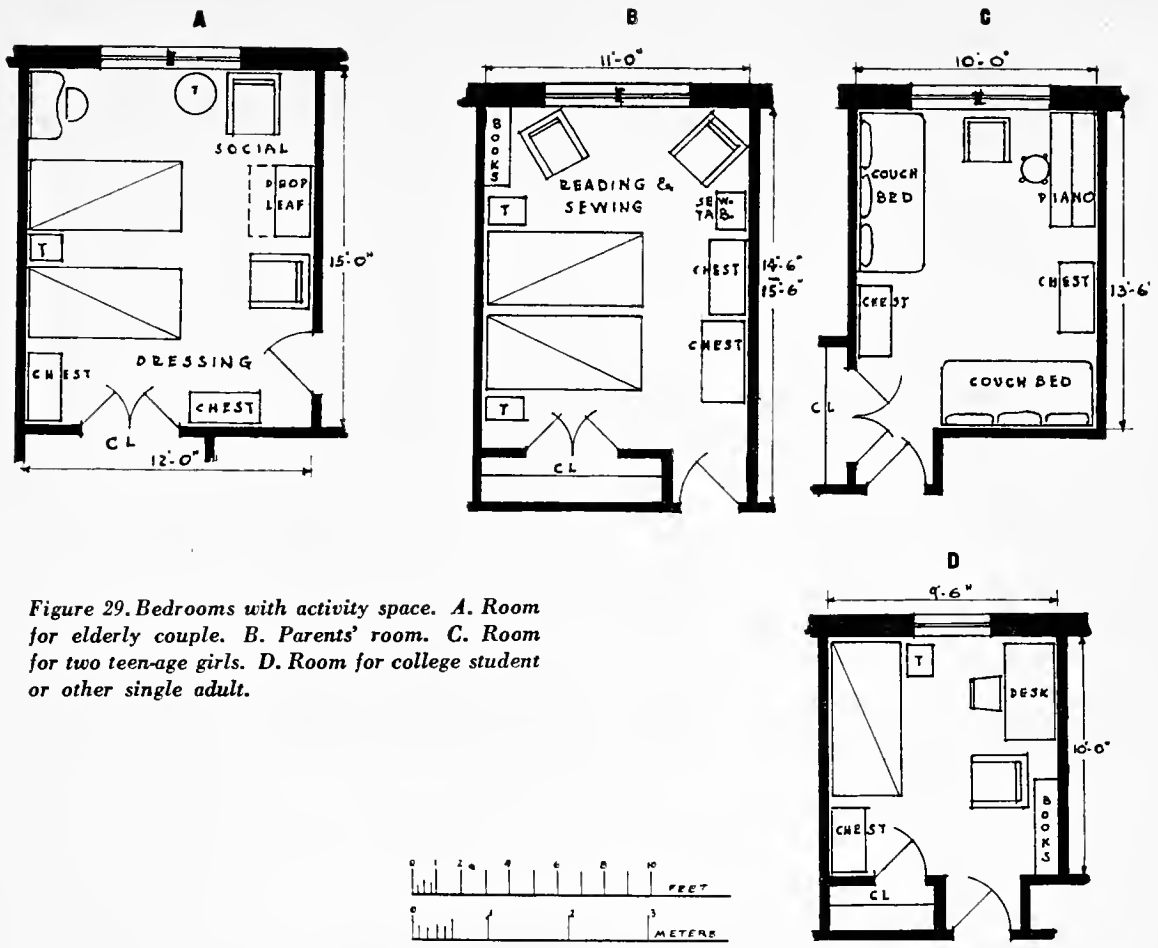


Figure 29. Bedrooms with activity space. A. Room for elderly couple. B. Parents' room. C. Room for two teen-age girls. D. Room for college student or other single adult.

closets Except in expensive apartments, closets with elaborate millwork are rare in housing projects, that is, in homes for sale and apartments in the medium and lower rental brackets. Usually a closet consists of enclosing partitions and shelving. Everyone would like to have the more elaborate type, especially if the closet design includes drawers and other facilities which obviate the need of some freestanding furniture in the rooms. The cost of such specialties is high, which is why they are not used more frequently. Consequently we shall not discuss the so-called "Storage Wall," further than to say that it is an excellent device, provided it affords resistance to airborne noises. Perhaps someone will ultimately market a wardrobe unit which costs less than a simple closet, which is not too bulky, and which, when installed, can be cleaned easily.

How much storage space should be planned? It is never too much, but a minimum for any dwelling unit is one closet for outdoor clothes, one for each bedroom, one for linens, some place for brooms, and additional space for general storage, whether it be in the dwelling unit or, as in apartments, in storage cubicles and common storage rooms in the basement or

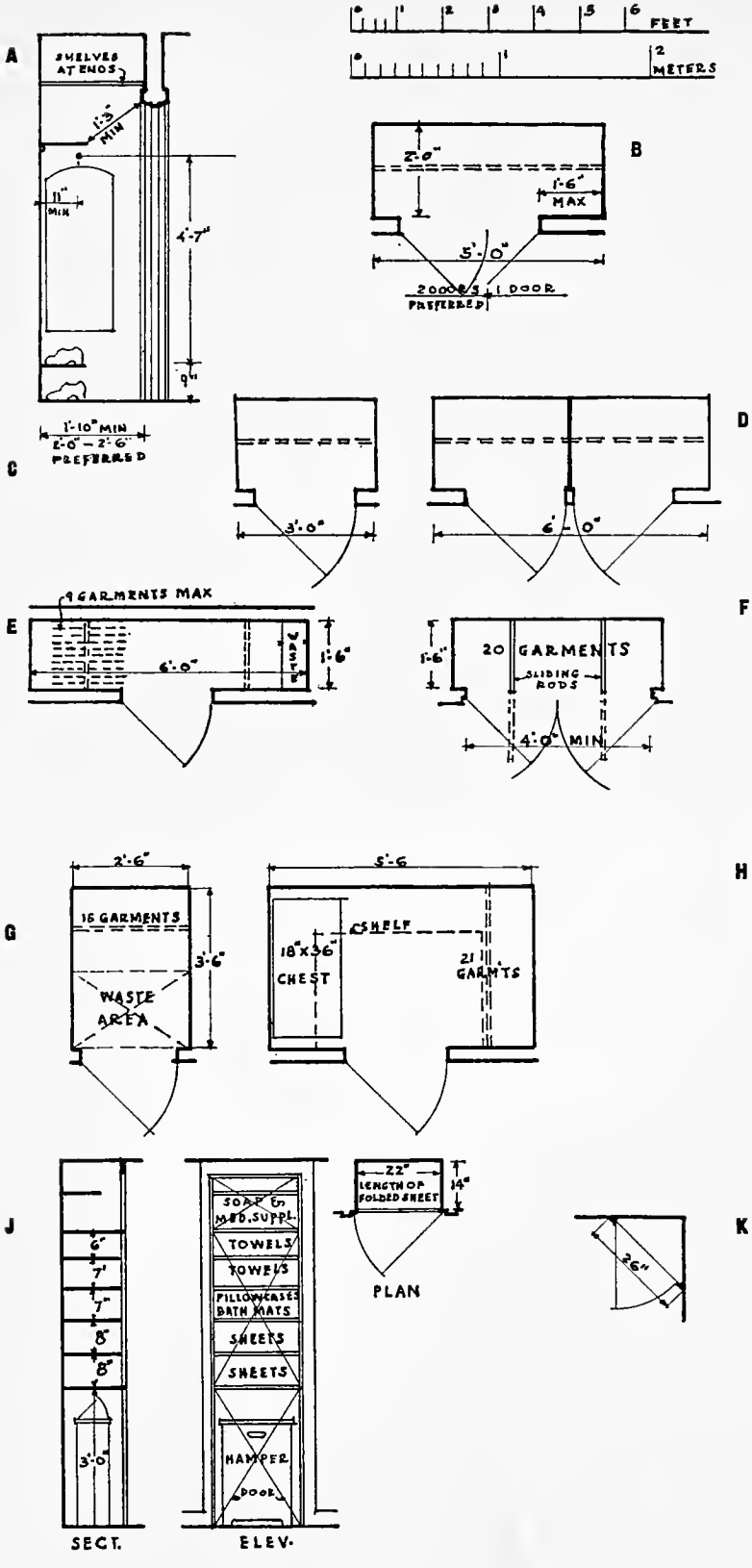


Figure 30. Closets. A. Section of typical clothes closet. B. Closet for two people. C. Closet for one. D. Closets for two. E. A closet that is too shallow and too long. F. A shallow closet that is reasonably useful. G. A closet too narrow and too deep. H. A closet using its depth to advantage. J. Small linen closet. K. Small corner closet for brooms or liquor; if the latter, put eight bottles on a shelf and be sure the door has a lock.

elsewhere. Such general storage space should be at least 30 square feet (2.8 square M) per family; more if possible since the occupant must have room for a variety of articles; surplus furniture, trunks, washing machine, perambulator, bicycles, garden tools, etc.

In judging the adequacy of clothes closets, two to three inches of rod lengths should be allowed for hanging garments; a pair of shoes takes six to eight inches of floor or shelf space.

Our illustrations show only certain elementary considerations. A, B, C, and D in Figure 30 are reasonable minima for usable closet space. Clothes closets less than 20 inches in depth should be avoided. E is a typical example of a closet that is too shallow. When a greater depth is impossible, the space may be used to best advantage by some such device as shown in F. Closets less than 18 inches in depth are good for golf clubs, fishing rods, baseball bats, skis, walking sticks, and family skeletons but for little else.

Closets which are too narrow and deep inevitably have waste space (see Figure 30-G). With the same depth, a longer closet such as shown in H may afford good storage space and even receive a chest of drawers, a particularly good device to create added playspace in children's rooms. J shows a good type of small linen closet, which avoids the common failing of too few shelves. Women customarily place incoming wash from the laundry at the bottom of the stack; the more the shelves the lighter the linens on each and the easier it is to keep the closet in order.

In two-story homes the broom is always downstairs when it is needed above. There should be one broom closet at each level. K shows a type of upstairs closet which can be installed in a corner and can accommodate at least a couple of brooms and a dustpan.

Staircases in two-story row houses without cellar create closet space that can be used for a variety of purposes, as suggested in Figure 31.

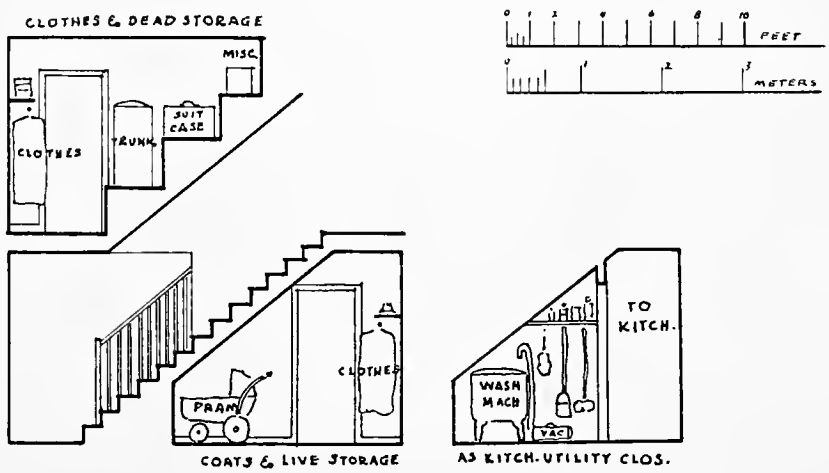


Figure 31. Closets at stairs in row houses without basements.

In single-family and group houses it is always well to have a sizable storage closet near the kitchen entrance for garden tools and other articles of outdoor use. Two examples, suggested by the United States Housing Authority, are shown in Figure 32.

Closet Doors. To save money, many public projects have omitted closet doors. Perhaps no other feature of public housing is more objectionable to occupants. The curtains they must hang cost them money and do not protect clothes from dust. If this cannot be avoided, the jambs of the opening should be detailed to receive doors at a later date, and the management should set up a fund for this purpose.

At present, sliding closet doors are again in vogue. They have the marked advantage that they do not stick out into the room, and they are desirable even though only half the closet space can be available at a time. Their installation is considerably more expensive than that of hinged doors —much more expensive hardware and more carpentry work (see Figure 33). If sliding doors are too narrow, they tend to tip and bind. The angle of the diagonal should not exceed 70° with the horizontal. (This is the writer's opinion, which has not been confirmed by tests.)

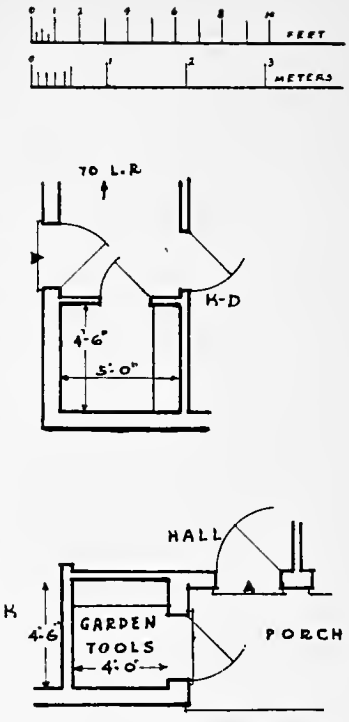


Figure 32. Row house utility closets.

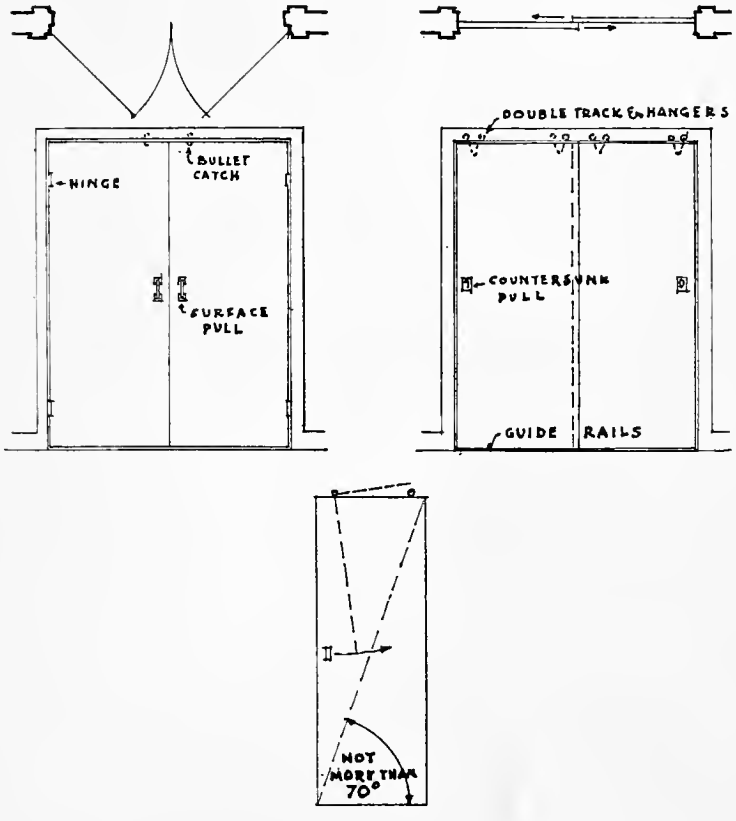


Figure 33. Closet doors, hinged (far left) and sliding. The hinged doors use less expensive hardware, are less expensive to install, and open full, not half-way. The sliding doors conserve space.

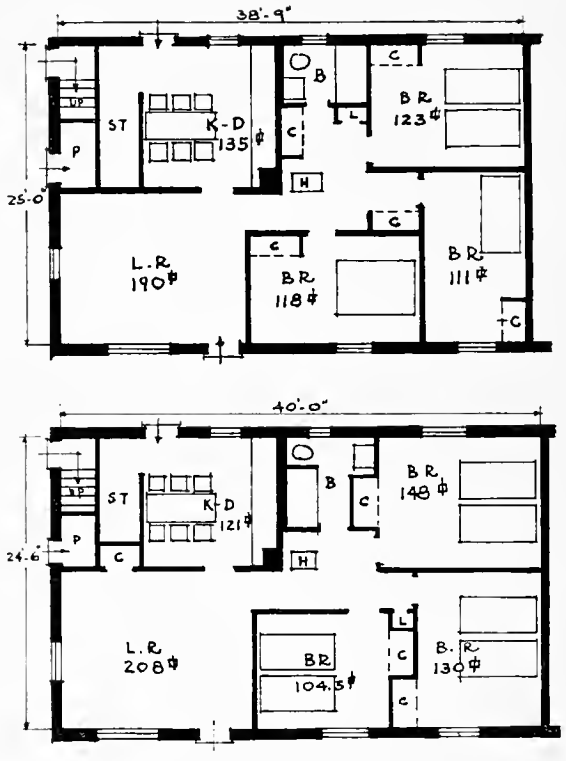


Figure 34. An example of inch-pinching. The plan at top is suitable for five persons and has an area of 967 sq. ft. (8.9 sq. M) with a net room area, excluding bath and closets, of 677 sq. ft. The plan at bottom is suitable for six persons and has an area of 980 sq. ft. (9 sq. M) with a net room area, excluding bath and closets, of 711.5 sq. ft.

Before entering into detailed discussion of dwelling units, it might be well to recall what we have said about skimping dimensions in the interest of alleged economy. Sometimes a very few additional square feet will permit much better and simpler planning which may prove to be less expensive when all elements of cost have been taken into account. To illustrate this we show in Figure 34 a plan of a twin flat building suggested by a Federal agency and a revision adding 1′3″ to the length and reducing the depth by 6″. The former has a gross area of 967 square feet, the latter 980 square feet. The addition of 13 square feet has accomplished the following:

1. A potential occupancy of six persons instead of five (plus 20%)
2. An increase in total net room area, excluding closets and baths, of 34.5 square feet (plus 5%)
3. An increase in net bedroom area (where it is most needed) of 30.5 square feet (8.7%)
4. Elimination of closets projecting into the bedrooms and halls
5. Simplification of framing

The moral of this tale is "Don't be an inch pincher!"

Little need be said of the detailed planning of the single-family detached house. The principles of the layout are much the same as for other types of dwelling. It should be noted, however, that in subdivisions of lots of less than one-hundred-foot frontage, the layout must conform in a measure to the general pattern of development. On narrow lots, if all other living rooms face the street, the one house placing it at the rear will be adversely affected. Conversely, if service towards the street and living toward the rear garden is the prevailing pattern, it is well to follow suit. Figure 35 presents three good plans of single-family units. In B the street front has been accepted as the desirable orientation; in A it is toward a rear garden; in C the architect has steered a middle course, perhaps because of sunlight or prevailing breezes. In any event, allowing a few feet between the garage and the adjacent lot line, this house would seem to require a lot width of 75-80 feet, if the bedrooms are to be screened for privacy.

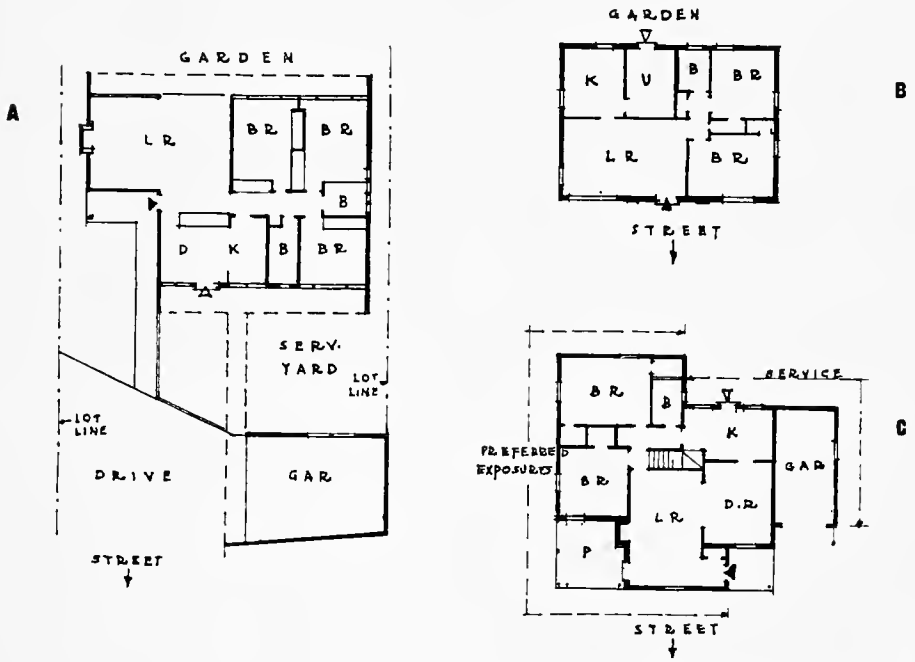
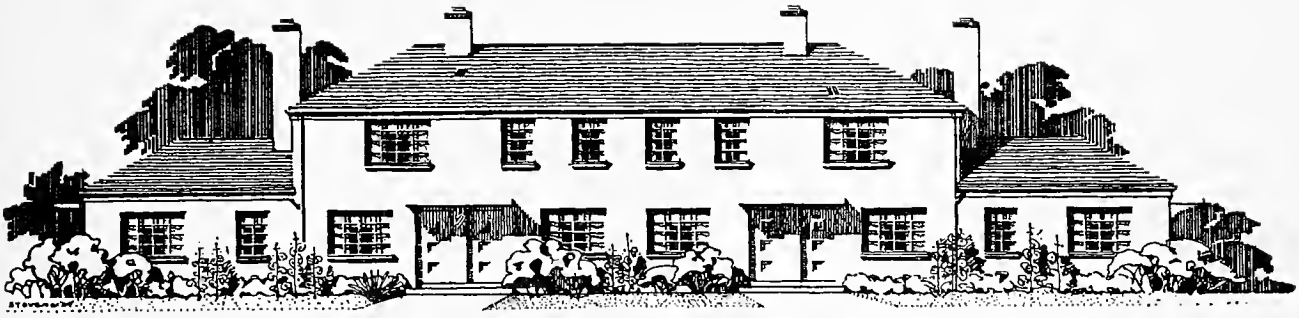


Figure 35. Single-family dwelling units. A. Service at front. B. Service at rear. C. Service at side. A: Gregory Ain, architect. B: Loebl, Schlossman & Bennett, architects. C: Edward W. Tanner, architect.



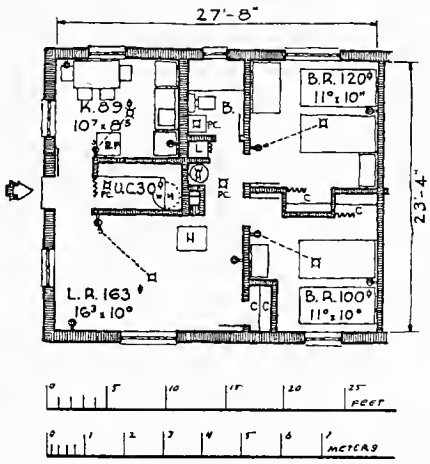


Figure 36 (top). Combination of one-story and two-story row houses. Federal Housing Administration. *Figure 37 (bottom). One-story twin house.* United States Housing Authority.

twin and row houses

Where land is inexpensive, one-story row houses are frequently used, sometimes in combination with two-story structures, permitting a pleasing articulation of the elevation (Figure 36). Except for the staircase, the planning of the one-story row house is similar to that of the two-story flat, with the advantage that there is no problem of access to the grounds. Usually such units have no basement, hence adequate storage space must be provided within the dwelling. Figure 37 is a good example of an economical layout. The one-story row house works out well with either one or two bedrooms. With three, it must be studied carefully to avoid excessive corridor length.

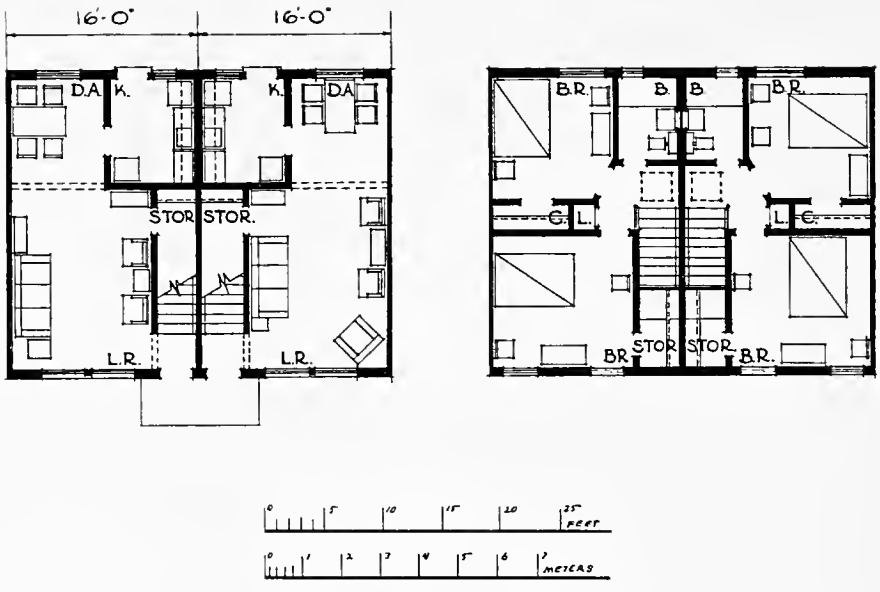


Figure 38. Two-story row houses with two bedrooms. Federal Housing Administration.

The two-story row house is ideal for a two bedroom layout even with fairly narrow frontages (Figures 38 and 39). If one, three, or four bedrooms are required, the layout is more difficult, since the area required on the first floor is not the same as on the second. The attempt to plan three bedrooms between party walls is likely to produce something like Figure 40. Here the first-floor plan is good, but two of the three bedrooms are miserably cramped. If they were adequate, the first-story rooms would be disproportionately large. One method of solving this dilemma is the use of interlocking plans. Note that such plans are possible only in rental housing. If the units were to be sold separately, just imagine the task of the attorney who would attempt a three dimensional legal description of the properties and an agreement between the buyers as to their respective rights in the overlapping areas!

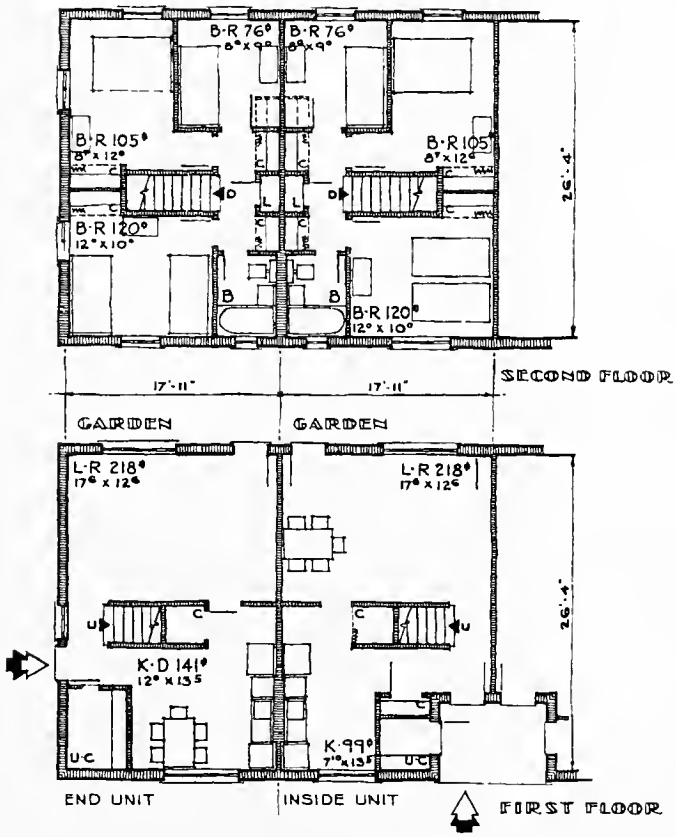
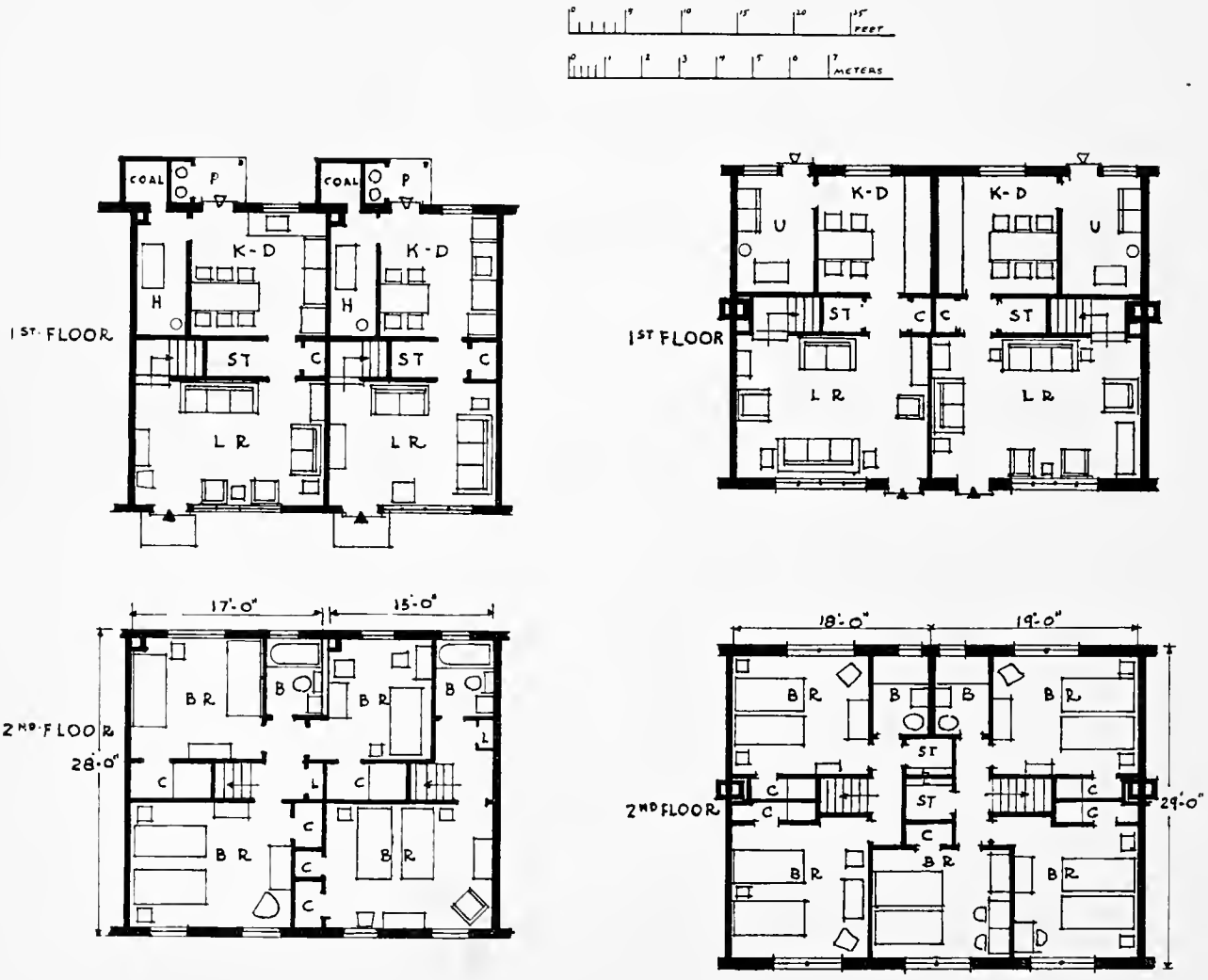


Figure 39 (top). Two-bedroom row houses. Federal Housing Administration. *Figure 40 (bottom). Three bedrooms in each unit.* United States Housing Authority.

Figures 41-44 show four solutions: 41 combines a three-bedroom and a one-bedroom unit; 42 and 44 combine a three-bedroom and a two-bedroom unit; 43, two four-bedroom suites. Figures 41-43 are predicated on heating supplied by the tenant. In 44 the landlord furnishes heat and hot water; it is taken from a medium-rental project, whereas the others are layouts for low rentals. Central heating is comparatively expensive for low buildings. In 41 and 42 the living rooms and dining kitchens have been made larger for the three bedroom unit than for the smaller dwelling. In 43 the size of the family has been recognized in the bathroom arrangement, which permits use by several persons at one time.

Figure 41 (left). Combination one- and three-bedroom houses. Eugene Henry Klaber and Arthur P. Davis, architects. *Figure 42 (right). Combination two- and three-bedroom houses.* Eugene Henry Klaber, architect.



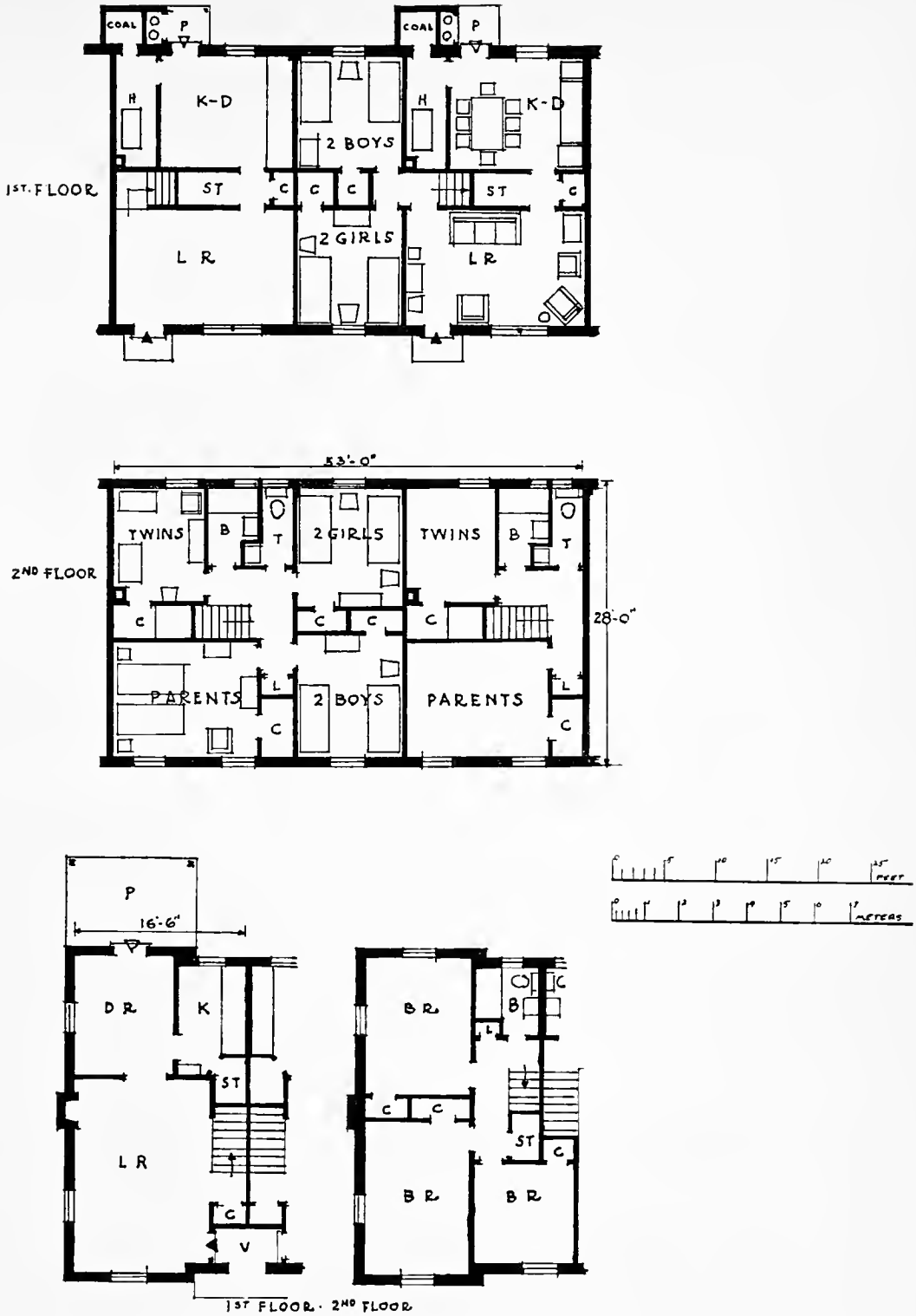


Figure 43 (top). Four-bedroom houses. Eugene Henry Klaber and Arthur P. Davis, architects. *Figure 44 (bottom). Alternate two- and three-bedroom houses.* Louis Justement, architect.

Thus far, all examples have been narrow-front units with the living rooms facing the street. Figures 45-47 present three plans of broad front units with the living room facing a rear garden: 45 has central heating; in 46 and 47 the tenant furnishes it; 47 is generous in dimensions and obviously commands a higher rental than the others; it is the only one which has a cellar for heating equipment, laundry, and storage. The broad front house has less party wall than the narrow. On the other hand, greater length of the more expensive outside walls is required, and this factor, added to the longer street frontage, is a deterrent to its use by the average builder.

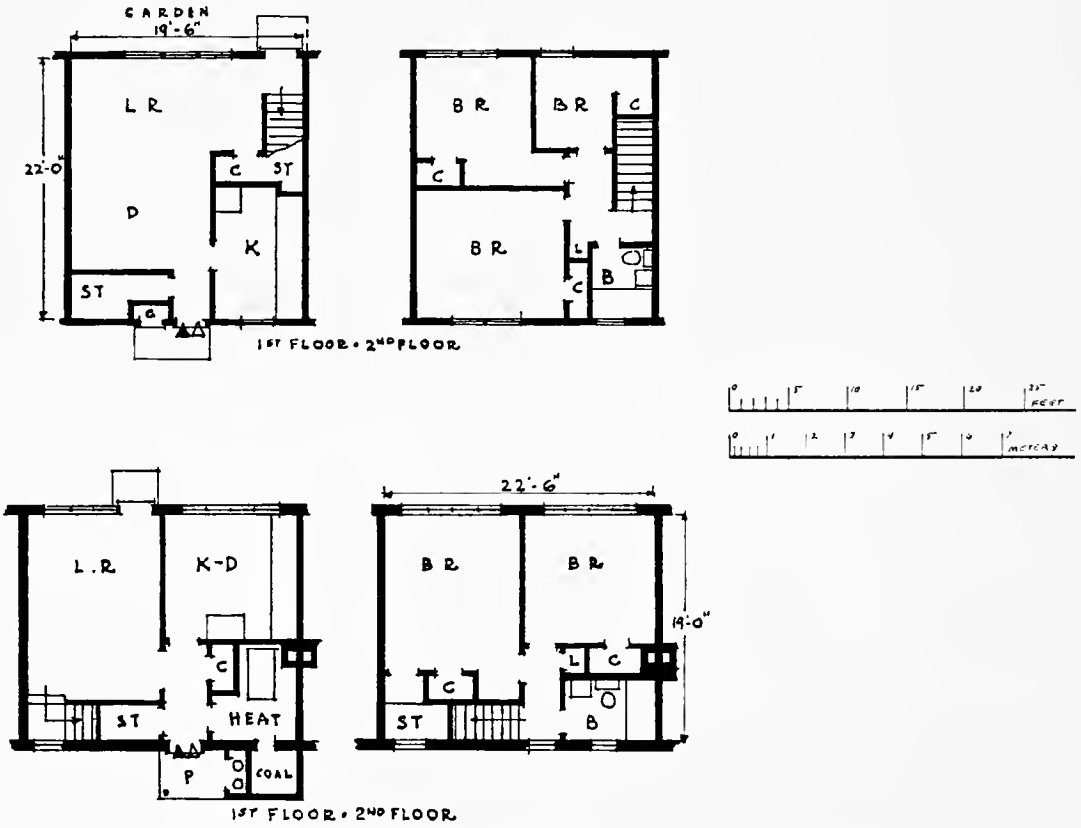
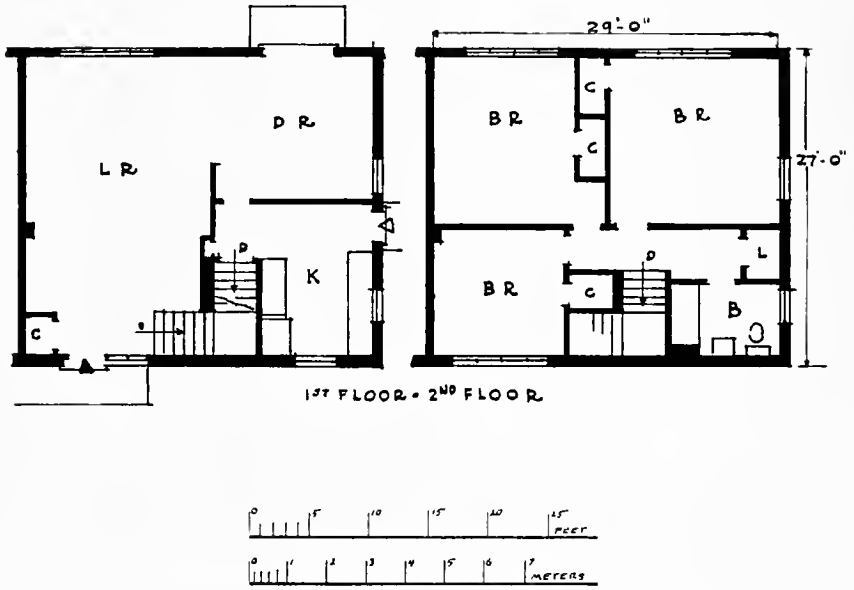


Figure 45 (top). Three-bedroom house with broad front and living room facing rear garden. Resettlement Administration. *Figure 46 (bottom). Two-bedroom house with broad front and living room facing rear garden.* Eugene Henry Klaber and Arthur P. Davis, architects.

Figure 47. Three-bedroom house with broad front and living room facing rear garden. Loebl, Schlossman & Bennett, architects.



three-story combinations

This type of building has a single apartment on the ground floor, above which are two row house units. Its advantages are:

1. less coverage of land per dwelling unit;
2. foundations and roof costs lower per unit;
3. a single plumbing stack serving three dwellings.

Where it is used some added measure of fire resistance should be provided for the walls, ceilings, and soffits of the flights of stairs leading to the upper units. Three examples are shown in Figures 48-50; 49 and 50 solve the

problem of the single plumbing stack. All require central heating, and none has adequate tenant storage space. Figure 48 has the benefit of private outdoor space for each tenant with the corresponding disadvantage of approach from two sides of the building. In 49 the living rooms face a rear garden area, but only the first-floor unit has direct access to it. The covered entrance porches are an interesting and useful feature, as well as the common laundry. The living rooms in Figure 50 face the entrance side; there is no basement, but the first-floor hall arrangement permits one if needed. In contrast with 48 and 49, in which the care of the stair halls is incumbent on the tenants, this plan requires cleaning by the management on the first and second floors.

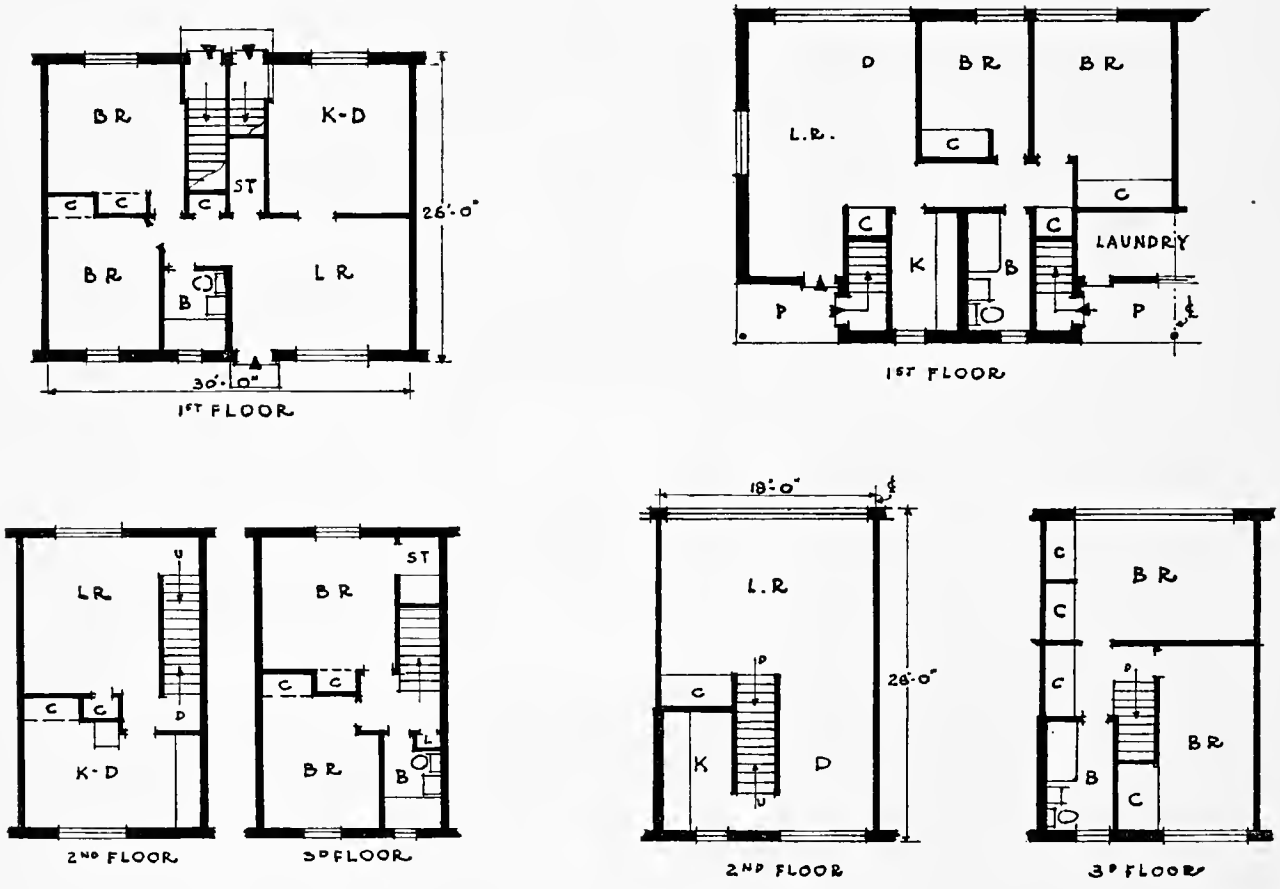
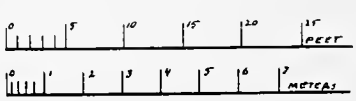
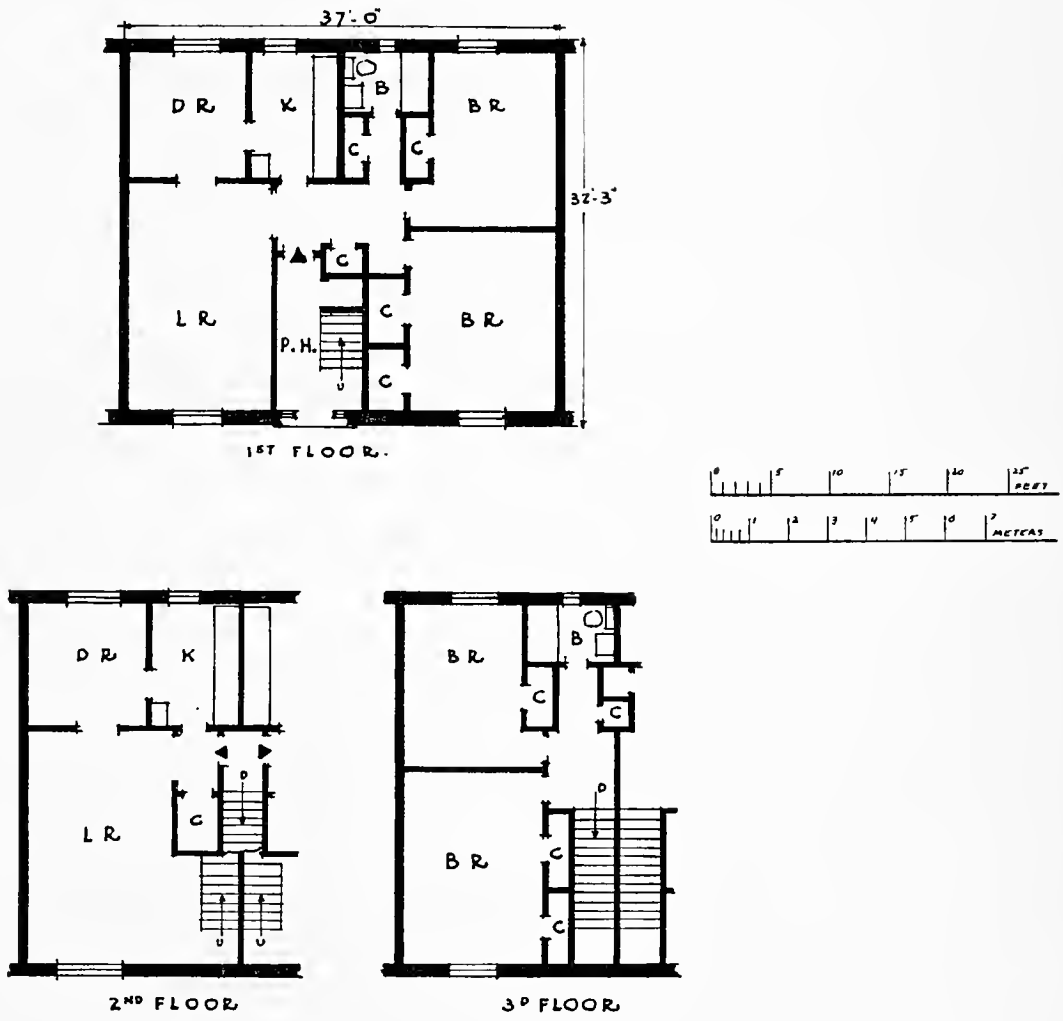


Figure 48 (left). Three-story flat and row house with entrances on two sides. United States Housing Authority. *Figure 49 (right). Three-story combination flat and row house with all entrances on one side. The principal rooms face the rear garden.* Charles M. Goodman, architect.

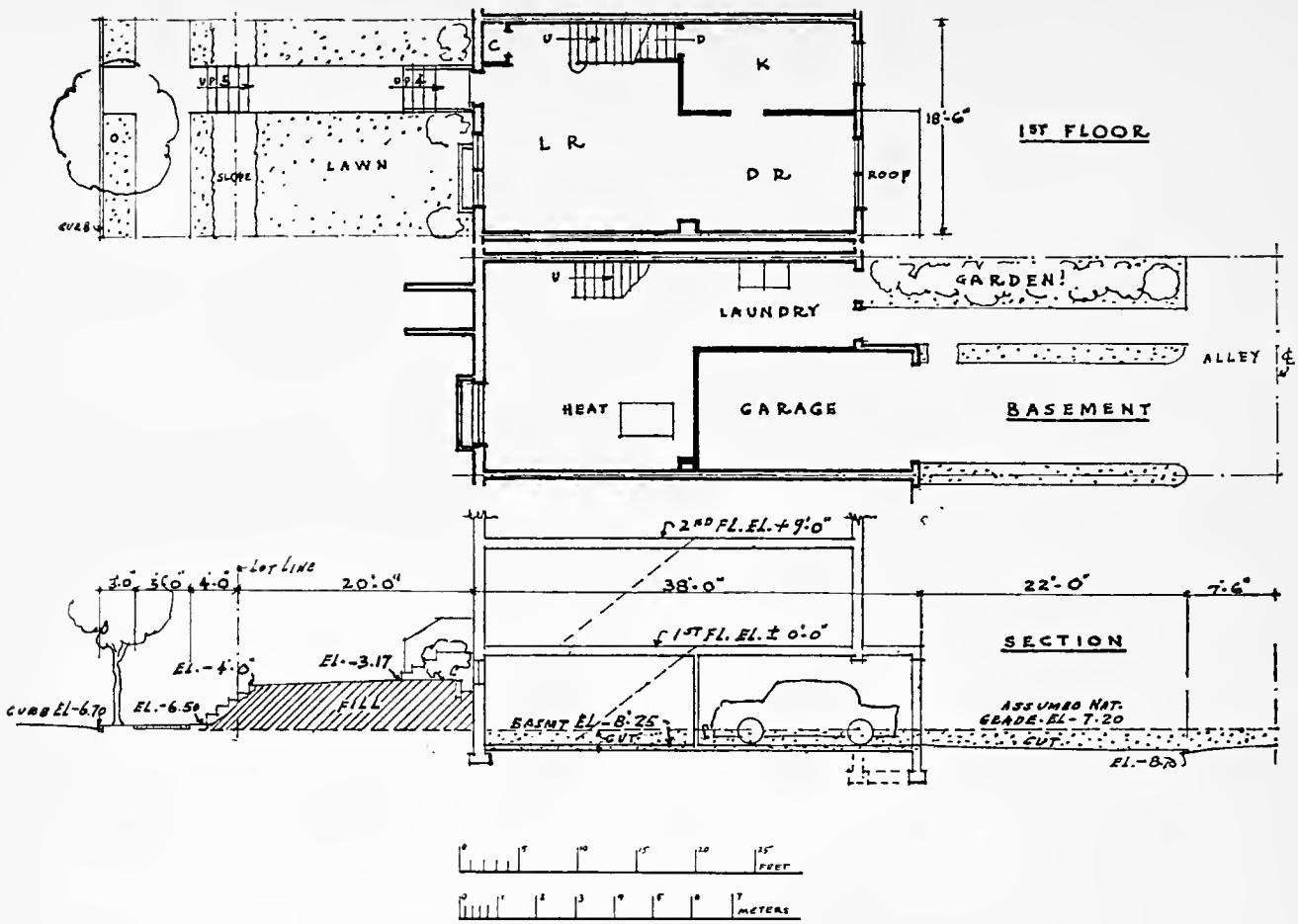


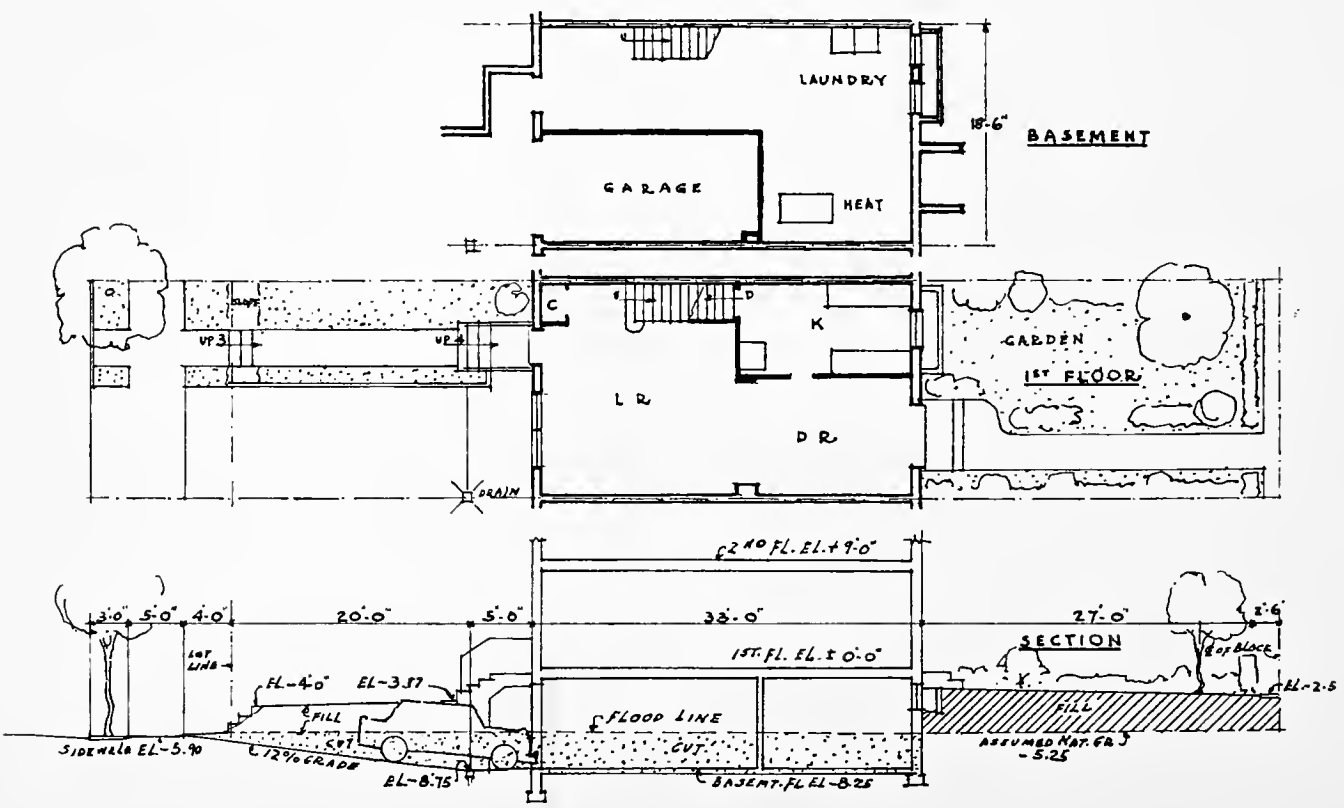
the basement garage In recent years there has been an increasing use of part of the basement of row houses to accommodate the family car. The great advantage of this practice is that the garage stall can be kept warm in winter. On the other hand, it makes the grounds practically useless. The rear of the buildings is given over to paths and driveway except for a miserable strip. In order to

Figure 50. Public hall to all units. De Young & Moscowitz, architects.



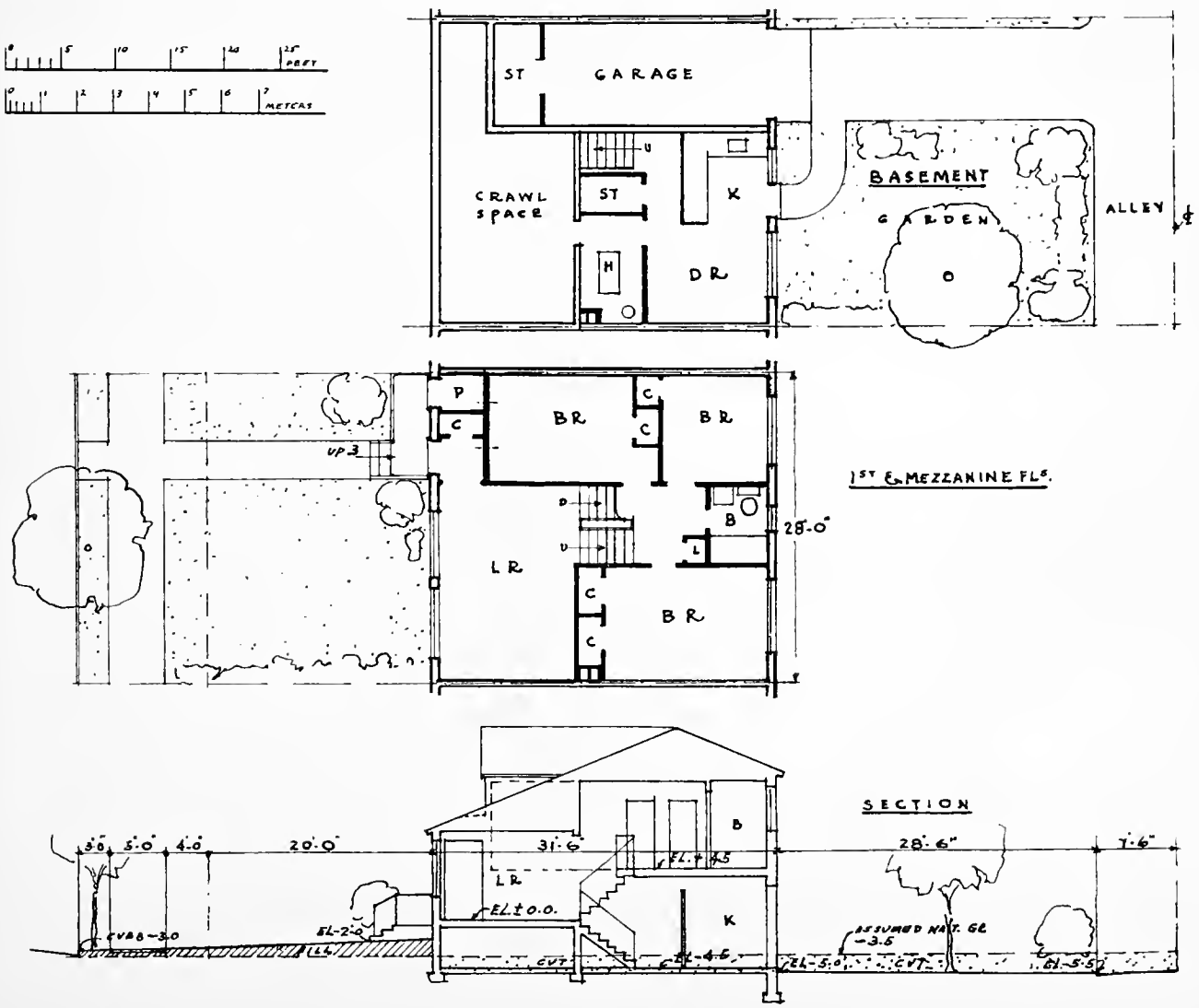
bring the garage floor above grade and to equalize cut and fill, the building is boosted up and a terrace created in front, involving flights of steep and dangerous exterior steps, as seen in Figure 51. This sort of thing is currently common in Philadelphia. In addition to its other faults, it requires


1ST FLOOR
K
L R
D R
ROOF
18'-6"
LAWN
SLOPE
CURB
GARDEN
LAUNDRY
ALLEY
HEAT
GARAGE
BASEMENT
SECTION
2ND FL. EL. +9'-0"
1ST FL. EL. ± 0'-0"
LOT LINE
3'-0"
5'-0"
4'-0"
20'-0"
38'-0"
22'-0"
7'-6"
EL.-4'-0"
EL.-3.17
CURB EL-6.70
EL.-6.50
FILL
BASMT EL-8'-25
CUT
ASSUMED NAT. GRADE EL-7.20
EL.-8.75
0 5 10 15 20 25 FEET
0 1 2 3 4 5 6 7 METERS


LAUNDRY
GARAGE
HEAT
18'-6"
BASEMENT
K
L R
D R
GARDEN
1ST FLOOR
DRAIN
2ND FL. EL. +9'-0"
1ST. FL. EL. ± 0'-0"
3'-0"
5'-0"
4'-0"
20'-0"
5'-0"
32'-0"
27'-0"
SECTION
LOT LINE
EL-4'-0"
EL-3.37
FILL
CUT
FLOOD LINE
SIDEWALK EL-5.90
12% GRADE
EL-8.75
BASEMENT FL EL-8.25
EL-2.5
ASSUMED NAT. GR. -5.25

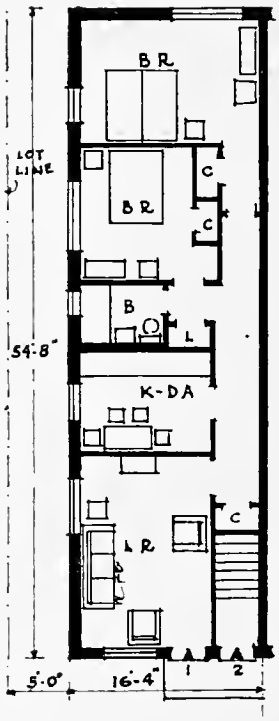
the housewife to go down a flight of steps whenever anyone comes to the back door. The suggestion has frequently been made that the basement garage be entered from the front, which would afford a private garden at the rear (see Figure 52). There is still a climb to the front entrance but not as much as in 51. However the entrance drive is an added cost, since it must have masonry side walls and it is hazardous to passers-by and to young children. Since the garage floor is below the sidewalk level, there must be a sizable drain in front of the door. If this drain fills with leaves the cellar will be flooded to the sidewalk level should there be a heavy downpour. Figure 53 gives a possible answer to the problem through the use of a three-level house. There are only three steps up to the entrance platform. Although the garage is towards the rear, there remains a sizable garden. This requires a wider lot, and the building is complex and probably costly in construction. The writer holds no brief for this scheme and is convinced that the built-in garage should not be attempted in row houses. Perhaps someone else can lick this toughie!

Figure 51 (opposite page top). Row house with garage in rear of basement. Figure 52 (opposite page bottom). Row house with garage in front of basement. Figure 53 (below). Three-level row house with garage. Eugene Henry Klaber, architect.



There are two possible advantages in the use of flats; they may place the burden of the cleaning of stair halls on the tenant, and they can be economically planned for one-bedroom as well as two-bedroom units, and a three-bedroom flat can be designed more readily than in row houses. They frequently present the following difficulties: service entrances on opposite sides of the building; if there is a basement, access to it for the second floor tenant is hard to work out; obtaining individual garden space for each tenant; if this is not achieved, there are likely to be disputes as to how much of the sidewalks and grounds is to be cared for by each; added cost and maintenance if local codes require two exits from the second floor units; adequate storage space in each dwelling unit in the absence of a basement.

As with other types of housing, the use of two-story flats on narrow and deep lots is expensive and wasteful. This is demonstrated in Figure 54; it shows a type of flat, frequent in the Midwest, in which the owner occupies the ground floor and rents out the second. Because of the depth of the plan, a side yard is necessary and these buildings are frequently built in pairs. Compare this plan with 55. The frontage of 54 is slightly less; the number of rooms is the same in each case; neither has adequate tenant



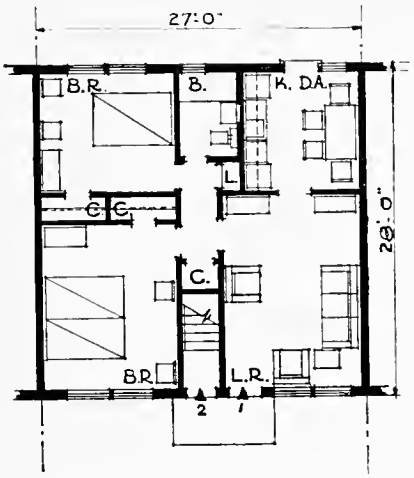
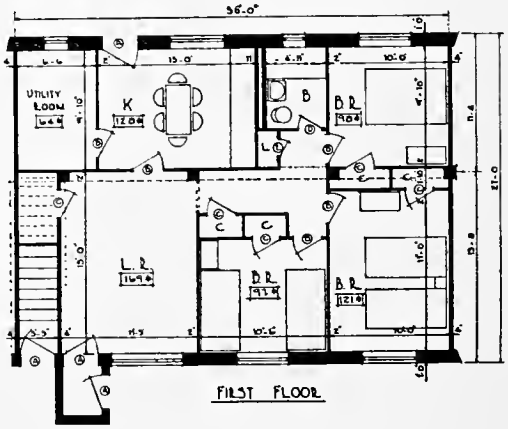


Figure 54 (right). Narrow-front flat. Figure 55 (left). Broad-front flat reduces hall space to a minimum. Federal Housing Administration. *Figure 56 (below). Five-room flat with good storage facilities.* Housing Division, Public Works Administration.



	Narrow	Broad
Frontage	21′ 4″	27′
Room sizes		
Living room	176 sq. ft.	184 sq. ft.
Kitchen-dining area	93½ sq. ft.	95 sq. ft.
Master bedroom	155 sq. ft.	155½ sq. ft.
Second bedroom	120 sq. ft.	115 sq. ft.
Bath	35 sq. ft.	35 sq. ft.
Gross area	892 sq. ft.	756 sq. ft.
Length of exterior wall	95 1/3 ft.	54 ft.
Length of half party wall	52 2/3 ft.	56 ft.

storage space. Total area of rooms is slightly greater in 55. To produce this much living area, 54 requires 146 additional square feet of gross floor area and 41½ additional linear feet of exterior wall. These differences are the measure of the wasteful planning of 54.

The need for storage space in the dwelling unit where there is no basement has been mentioned. This requirement is met admirably in the unit shown in Figure 56.

An individual heating plant for each tenant is desirable because of added cost of central heating plants. Two solutions are presented in Figures 57 and 58. Coal is used in 57. Each flat has its heater room and fuel storage bin. This plan is workable only in twin or end units. It requires duct work or piping for distribution and involves the loss of one bedroom on the first floor. The heating shown in 58 is possible only if a fuel leaving no residue (preferably gas) is used. In this case the ceiling of the hall is furred down, forming a plenum chamber which distributes the heat. This is an inexpensive installation. Of course, where electricity is sufficiently cheap, it is the most desirable heating medium, since its control is flexible and the necessary equipment takes up little room.

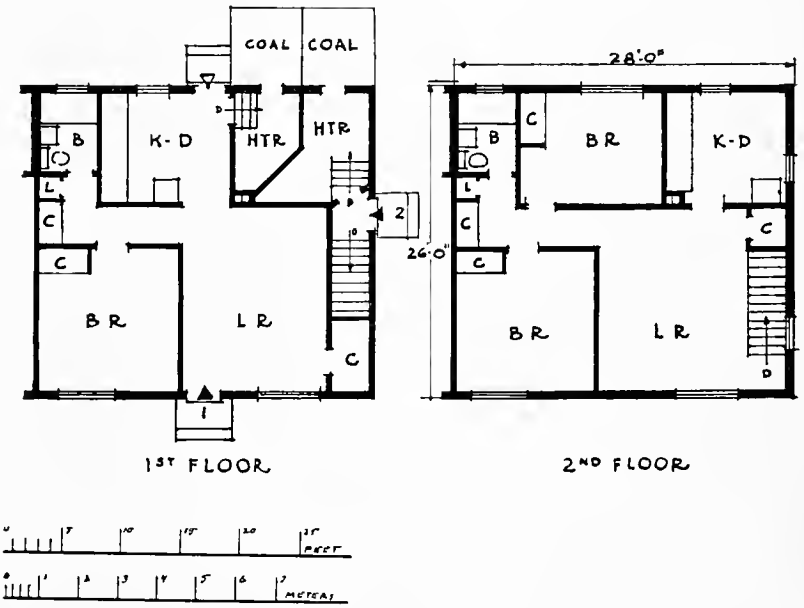


Figure 57 (right). Flats with individual coal heating. Edward H. Wigham, architect; W. L. Van Alen, associate.

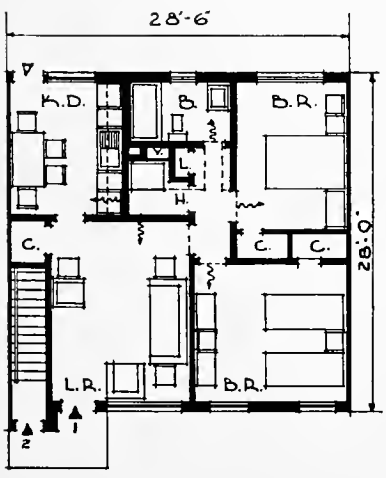


Figure 58 (left). Flat with individual gas or oil heat. Federal Honsing Administration.

A requirement of two means of exit from second floor flats raises the question whether some other form of dwelling would not be preferable. We believe it would. For what they may be worth we present two plans with double exits (Figure 59, A and B). Both have an excessive area devoted to stairs, both have access to the front and rear. A has no basement and would normally require central heating. B is much the type of thing that was done in St. Louis in the past. Second-floor units have individual front stairs, but in order to give access to basement facilities, there is a common service stair, which means that since the landlord doesn't clean it, nobody does. Go and look for yourself!

The provision of private gardens for tenants of flats requires not only access to the gardens, but careful study of the lay-out of both house and gardens to avoid having the second-floor tenants camped in front of the living room or bedroom windows of the first-floor occupant (see Figure 60). A shows an admirable solution; there is service to both units on one side. The scheme is somewhat expensive, but the only other adverse factor is that the tenant of the upper floor has no direct access to the park area.

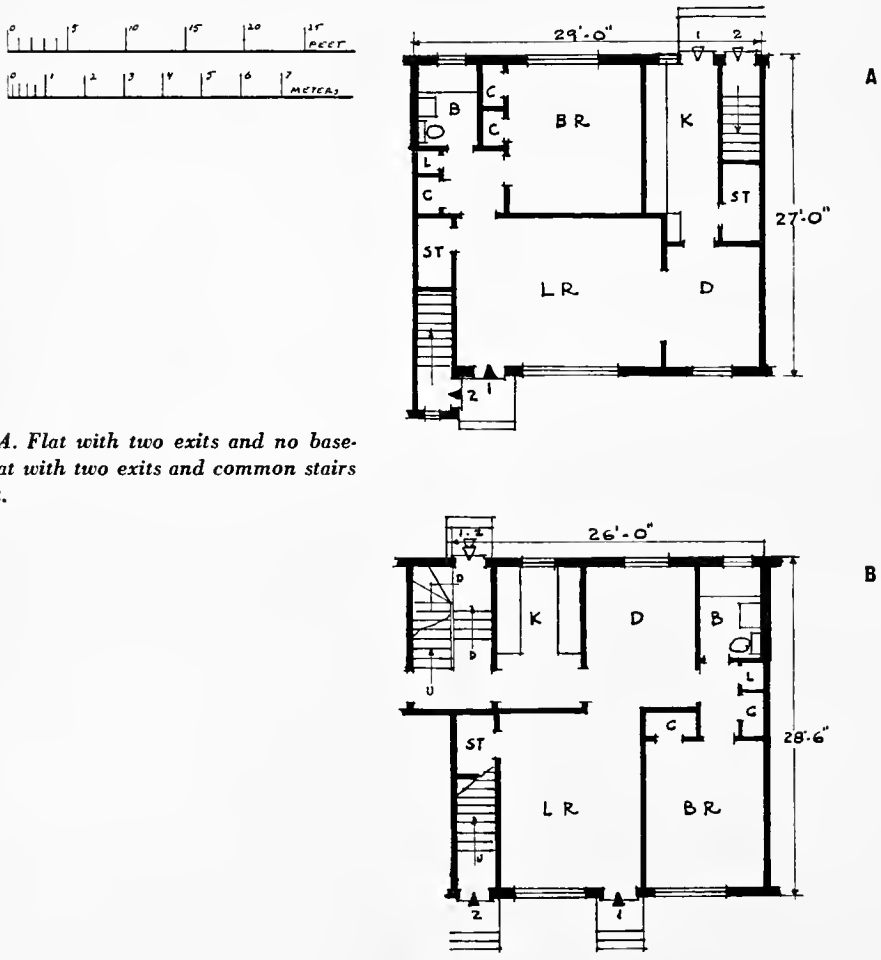


Figure 59. A. Flat with two exits and no basement. B. Flat with two exits and common stairs to basement.

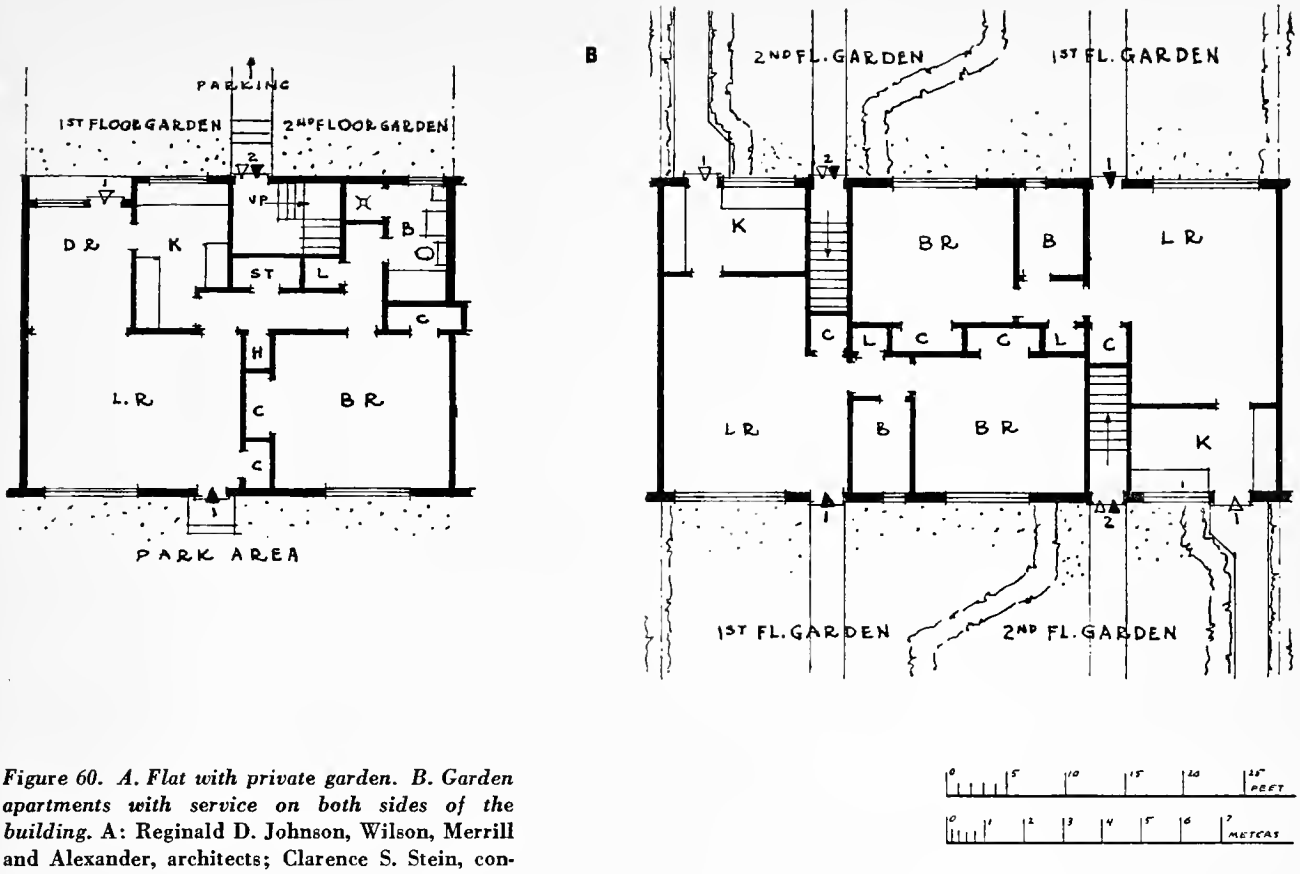


Figure 60. A. Flat with private garden. B. Garden apartments with service on both sides of the building. A: Reginald D. Johnson, Wilson, Merrill and Alexander, architects; Clarence S. Stein, consulting architect. B: Federal Housing Administration.

B is a less expensive scheme. Its cardinal fault is that two units are serviced from each side of the building.

apartments

Natural Ventilation In the types of unit we have discussed so far, there has been no question of adequate natural ventilation, since most of them have been two rooms deep and had two opposite sides exposed. In apartments the question arises more frequently, since the dwelling unit does not always extend in depth from wall to wall. It is frequently assumed that natural ventilation will exist whenever there is a breeze. True, if the outside air is still, there is none. However, the essential condition of ventilation in any *room* is inequality of air pressure on the walls which may permit air to pass through. A corner room has two adjacent sides exposed. Even though windows are open on both these sides, there will be no natural draft should the wind happen to be coming from a direction 45 degrees to both, or exactly parallel to one.

In discussing ventilation, we shall use two terms which require definition: "through ventilation" can exist when there is a possibility of the passage of air between opposite and parallel walls; "corner ventilation" when two outside and adjacent walls of a unit are at right angles to each other. The term "cross ventilation" is not used because it is so frequently employed to designate one or the other. Through ventilation is preferable to corner. This is demonstrated in Figure 61.

In A there are two wind directions at which there is no draft through the rooms, and two quadrants of the circle which afford optimum draft conditions. In B the greatest likelihood of draft occurs when the wind approaches within two octants of the circle. One quadrant is "dead" and a 45% wind also rates zero. These conclusions are theoretical. Minor factors may provide a draft where none would exist normally; thus there may be breezes reflected from adjacent buildings, and casement windows opening out may be arranged to trap a wind which would otherwise escape. Corner ventilation is sometimes assumed for apartments consisting of a string of rooms, one of which is at a salient corner of the building. Actually this can be assumed only for the end room (see Figure 62). The question then arises, what should be the relation in length of the two outside walls of a corner apartment? The best chance of good draft seems to exist when the exposed walls are of about equal length. This is an opinion, not a proven fact.

Essential and desirable characteristics of apartment plans Briefly summarized they are the following:

Essential

1. It should not be necessary to pass through any other major room to reach the living room.
2. Wherever dining takes place, the kitchen should be immediately adjacent.
3. Bedrooms should be accessible without passing through any other room except the living room or dining space.
4. Passage from any bedroom to the bath should not be through another room.
5. At least one bath should be accessible to all rooms without passage through a bedroom.

Desirable

6. Living room should not be the only passage to other rooms.
7. Bath should not be across entrance hall from bedrooms.
8. Hall or foyer should give direct access to all rooms.
9. Public rooms (K-D-L-R) should be separable from private rooms (BR-B).
10. Circulation should be direct and compact.

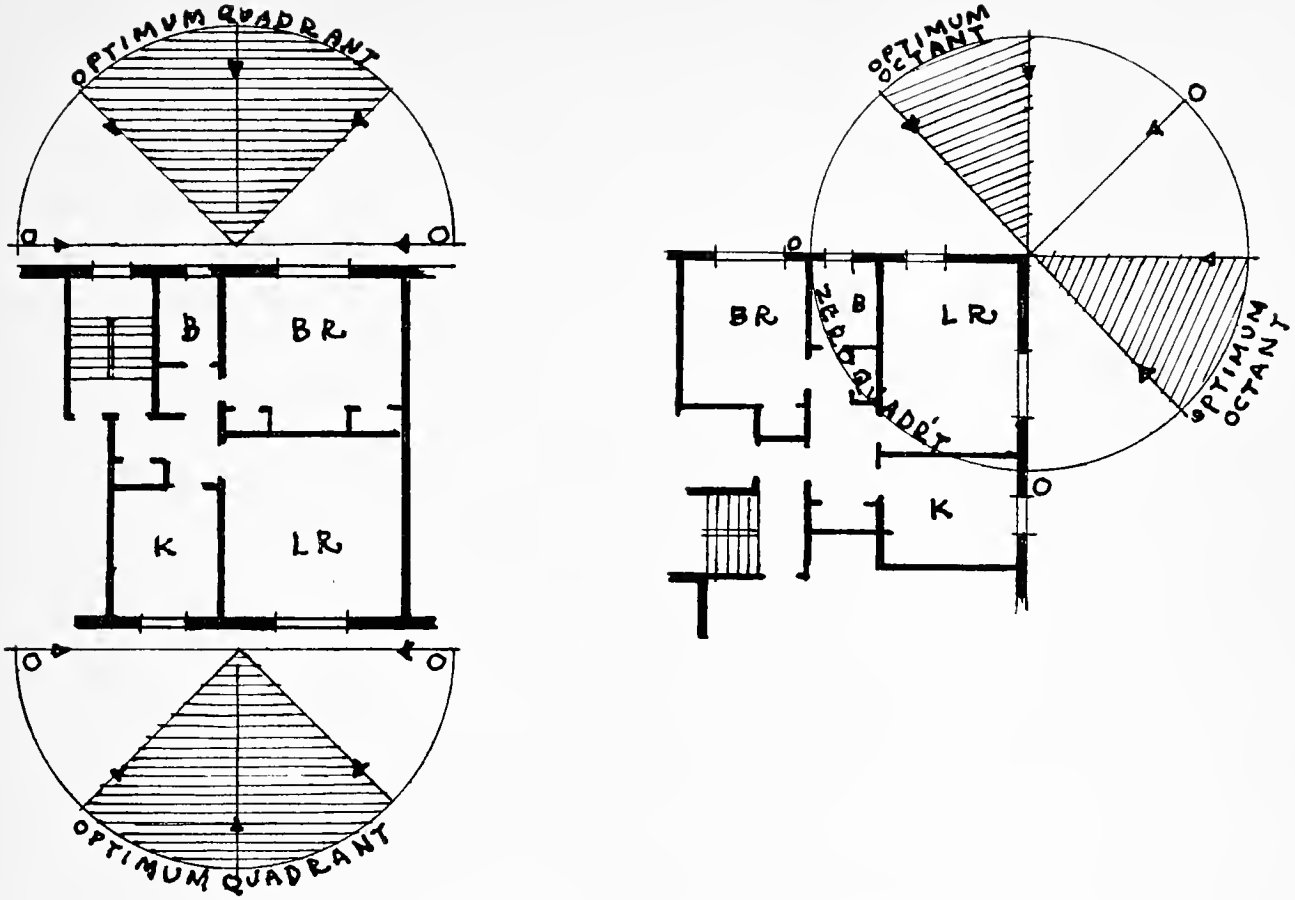
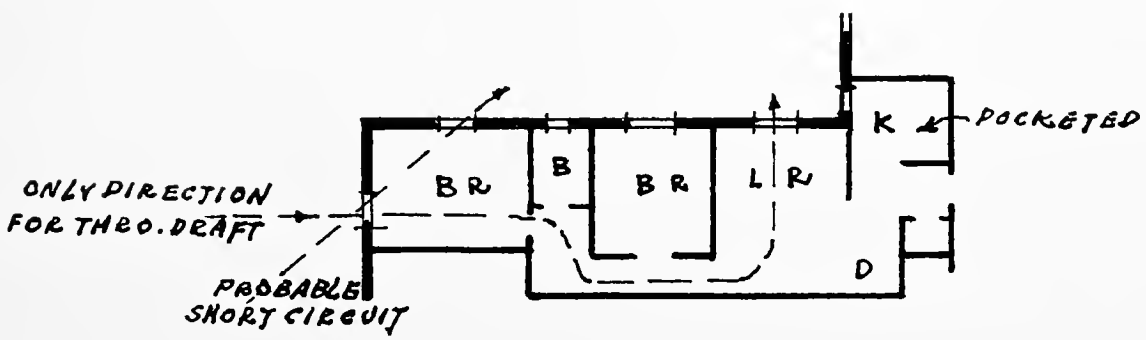


Figure 61 (above). A. Through ventilation. B. Corner ventilation. Figure 62 (below). Compromised corner ventilation.



Privacy of access Full privacy of access (item 8 above) adds enormously to the livability of an apartment. It permits the use of the living room by occasional overnight guests with adequate privacy for them and for the family. Four examples are shown in Figure 64. A has one bedroom; B, two; C and D, three. Presuming sleeping in all bedrooms and the living room, every occupant can reach the bath, the kitchen, and the entrance door without disturbing anyone. If guests sleep in a living room which is the only passage to the bedrooms, the objection is not one of propriety but of disturbance caused by walking through and turning lights on and off. Note that both three-bedroom units are possible only at the end of a building wing, whereas A and B can be used in a continuous strip of building.

All four of these plans require a certain length of hallway. It is possible to eliminate part of this space whose only purpose is circulation and still preserve reasonable privacy. This is frequently achieved by affording a second way to the bedrooms which by-passes the living room (Figure 63). A affords greater privacy in the living room and the alternate way is through two doors instead of three as in B. In other respects B is the better plan, the arrangement of living room and dining alcove being particularly desirable.

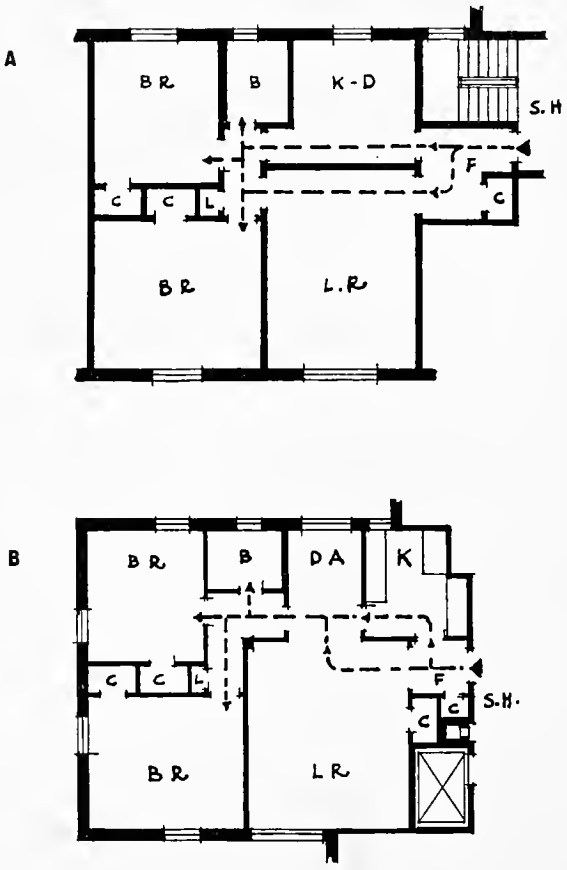


Figure 63. A. Four-room apartment in walk-up building. B. Four-and-a-half-room apartment in a six-story elevator building. A: Federal Housing Administration. B: Alfred Fellheimer and Steward Wagner, architects.

Figure 64. Privacy of access. A. One-bedroom unit. B. Two-bedroom unit. C. Three-bedroom unit in an elevator building. D. Three-bedroom unit in a walk-up building. A: Federal Housing Administration. B: Eugene Henry Klaber, architect. C: James Mackenzie, Sidney L. Strauss, Walker & Gillette, architects. D: Eugene Henry Klaber, architect.

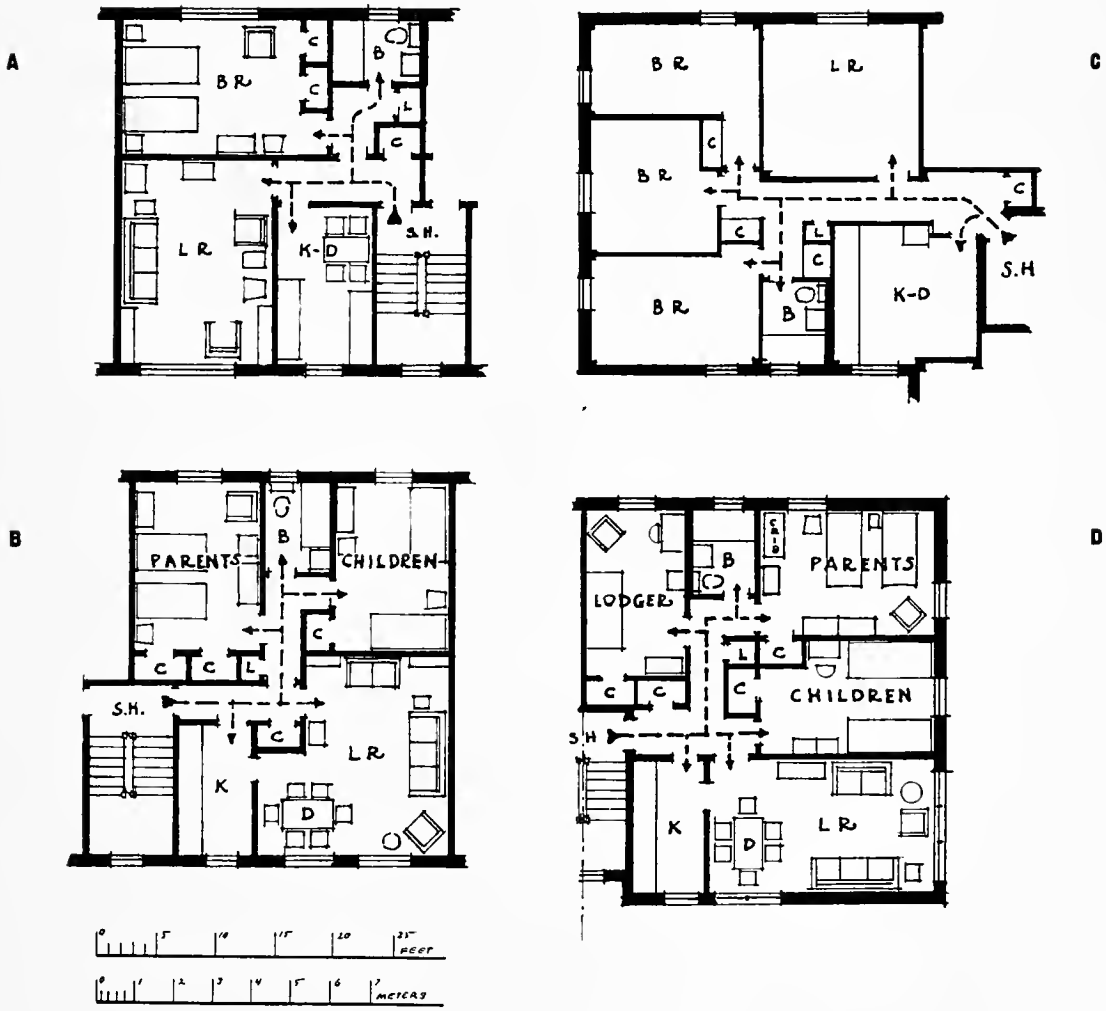
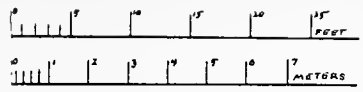


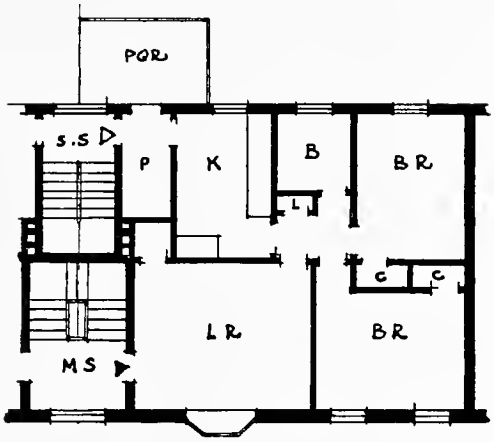
Figure 65 (opposite page). A. Stairs back to back. B. Stairs on opposite sides. C. Interlocking stairs. A: R. Clipston Sturgis, architect. B: Federal Housing Administration. C: Skidmore, Owings & Merrill, architects.

Double exit In some cities building codes require that all apartments have two means of egress, and usually such requirements state that they must be "separate and remote," the degree of remoteness being somewhat vague. These regulations affect the planning of the dwelling unit, and various methods of meeting the need have been evolved, some questionable, some good. One can hardly hold a brief for the fire-escape balcony, so common in New York non-fireproof tenements, which are dangerous to use and invite burglary. The rear wooden service stairs, as we find it in Chicago and New England, are hardly better. To do the job properly requires a safe and substantially constructed service staircase, accessible either directly from the apartments or else in the form of a fire tower with open access balconies. Figure 65 shows three plans with service stairs within the building. A is the most usual form and is entirely satisfactory unless some fussy building department insists that the exits are not sufficiently remote. B meets this objection but raises the question how to handle the end unit of a straight row without having one staircase serving only one apartment per floor. A method of doing this is suggested in the small scale sketch. Here a staircase is saved by making one service stairs serve three apartments per floor. C uses two straight run interlocking staircases. It permits an apartment layout which is simple and logical at the expense of two undersized bedrooms on the first floor. On the other hand, it gives rise to several operating dilemmas because each staircase reaches an apartment hall and a kitchen alternately. Whichever stair is used for waste removal, the occupants of at least one floor will have to carry trash and garbage around through the living room, and when Dagwood invites the boss for dinner, Blondie may have to receive him at the kitchen door when she is putting the finishing touches to the meal.

The split wing Elements of vertical circulation—stairs, elevators, and incinerators—are expensive, and it is hardly surprising that builders seek to divide these costs among as many apartments as possible. If the apartments occupy the entire width of the wings adjacent to the public halls, they can be efficiently planned without excessively long corridors, but whenever two apartments share the width of the wing, the planning is sure to be wasteful. It takes enormous ingenuity to beat this problem. Figure


FEET
METERS

A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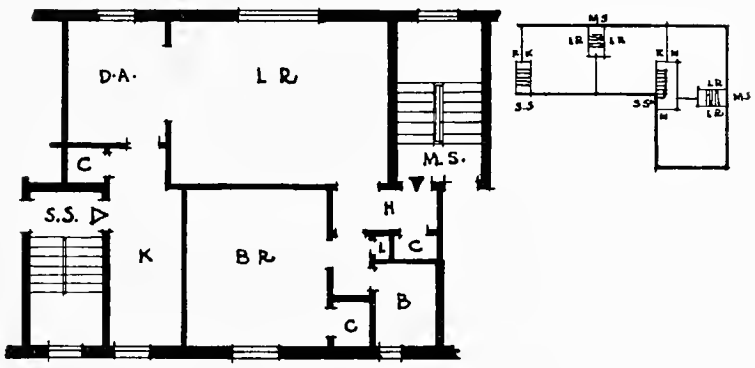
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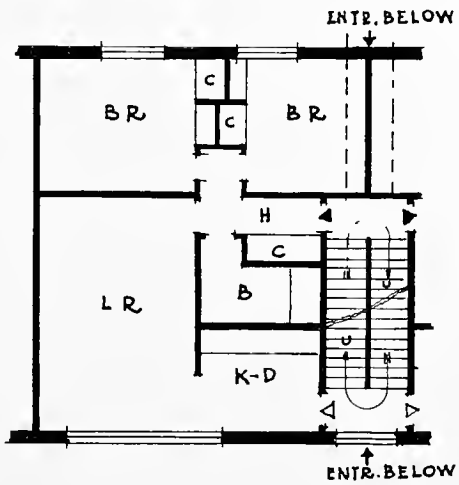
ENTR. BELOW
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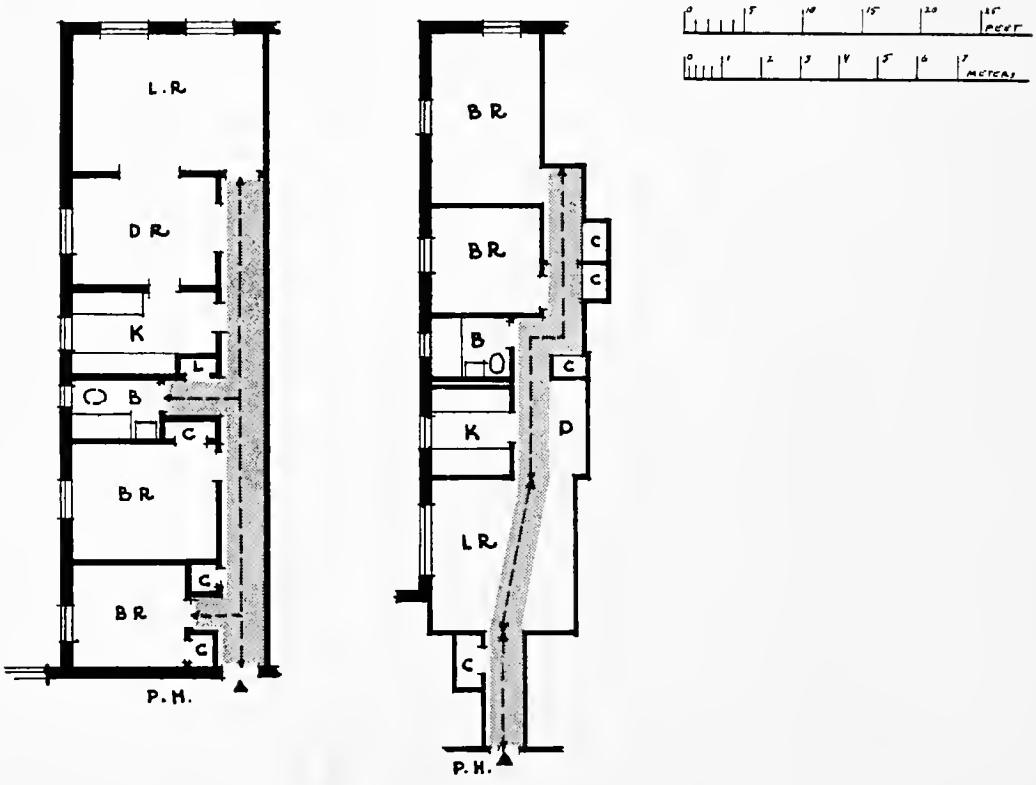
K-D
ENTR. BELOW

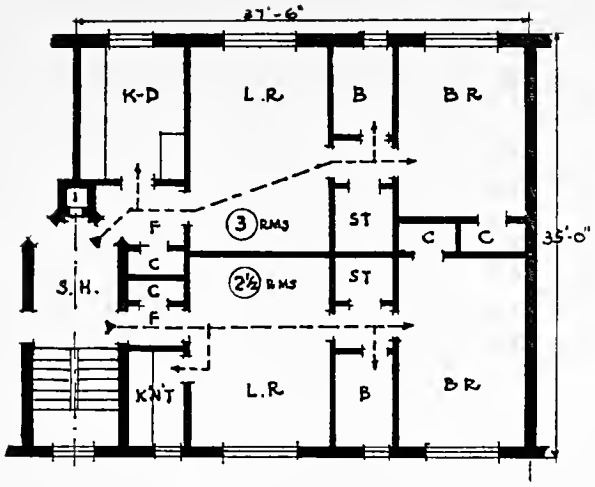
66 compares a unit built in 1902 with one planned half a century later. Bad as it was, the old model at least afforded possible privacy in all the rooms; the later product may explain why girls leave home.

In a lesser degree, the same problem bedevils the architect who attempts to arrange more than two apartments per staircase in a straight line building unit. At least one apartment and sometimes all four will lack good ventilation. See Figure 67 for examples. Of the three schemes shown, A has 100% of the units without through ventilation; B, 50%; and C, 33⅓%. In the last instance the low percentage is obviously due to the fact that there are only three instead of four apartments. Perhaps the best feature of C is that circulation does not cross the living rooms. This has required slightly greater length of exterior wall per room (140 linear feet for ten rooms as compared with 150 linear feet for eleven).

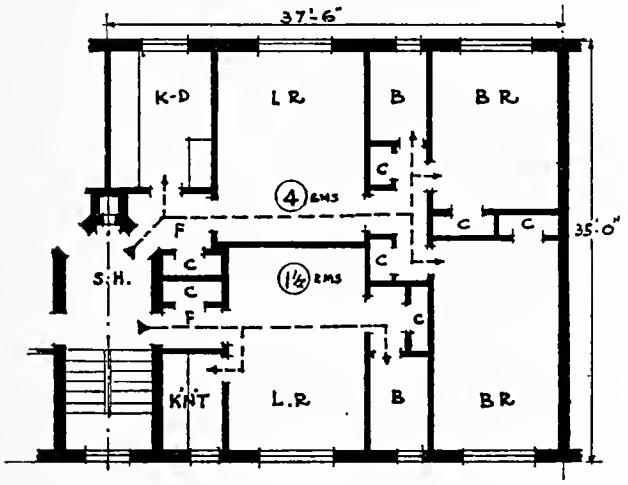
Figure 66. The split wing. From the dark ages of 1902 (left), total corridor length of 48.5 feet (14.75 M). Today's product, total corridor length of 39 feet (12 M), excluding living room crossing, and 51.5 feet (15.5 M), including living room crossing (right).

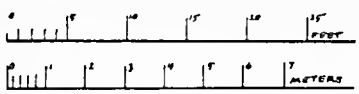


A



B





C

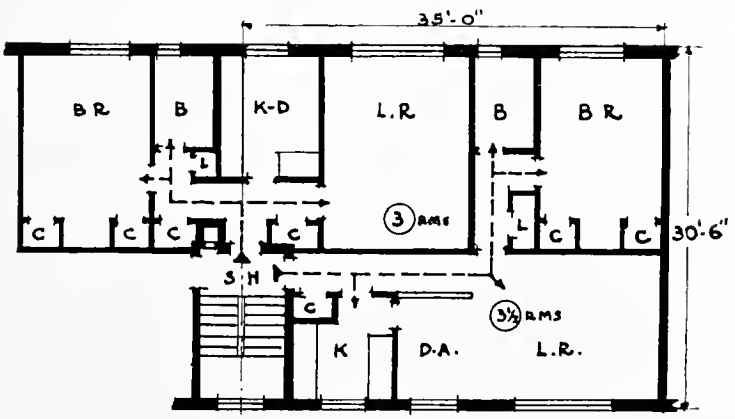


Figure 67. A. No apartments have through ventilation. B. Only half the apartments have through ventilation. C. A third of the apartments are without through ventilation. A: Clarence S. Stein, architect. B: Clarence S. Stein, architect. C: Eugene Henry Klaber, architect.

Unit	A	B	C
No. of apartments per unit	4	4	3
No. of rooms per unit	11	11	10
Gross area per room	238.5 sq. ft.	238.5 sq. ft.	214.2 sq. ft.
Exterior wall per room	13.6 ft.	13.6 ft.	14 ft.
Party wall per room	3.2 ft.	3.2 ft.	3.0 ft.
Area of stair hall per room	30.25 sq. ft.	30.25 sq. ft.	28 sq. ft.

Corridor-type apartments Throughout this discussion considerable emphasis has been laid on the desirability of natural ventilation through the apartment unit. In some cases this cannot be arranged, especially for small suites. If the building is on expensive in-lying land requiring high rise construction, the architect may be compelled to dispose the units two sides of a central corridor, which gives access to the stairs, elevators, and other service elements. The majority of units will inevitably be "pocketed" in such cases. This defect can readily be corrected by artificial ventilation, but since this is economically possible only in tall buildings, the long corridor type should be avoided in walk-ups. Figure 68-A is a very desirable type of unit for one or two persons. It has the added amenity of a private balcony. Anent balconies, it should be noted that they are good *if they will be used.* In cities where dust, smoke, and soot are prevalent, this may not be the case. The balconies catch dirt which not only soils the outdoor furniture but blows into the interior. Before planning to use balconies, it is well to check up on this. In New York one seldom sees tenants using this space for which they have paid extra rent. Figure 68-B shows a clever method of obtaining corner ventilation in corridor apartments.

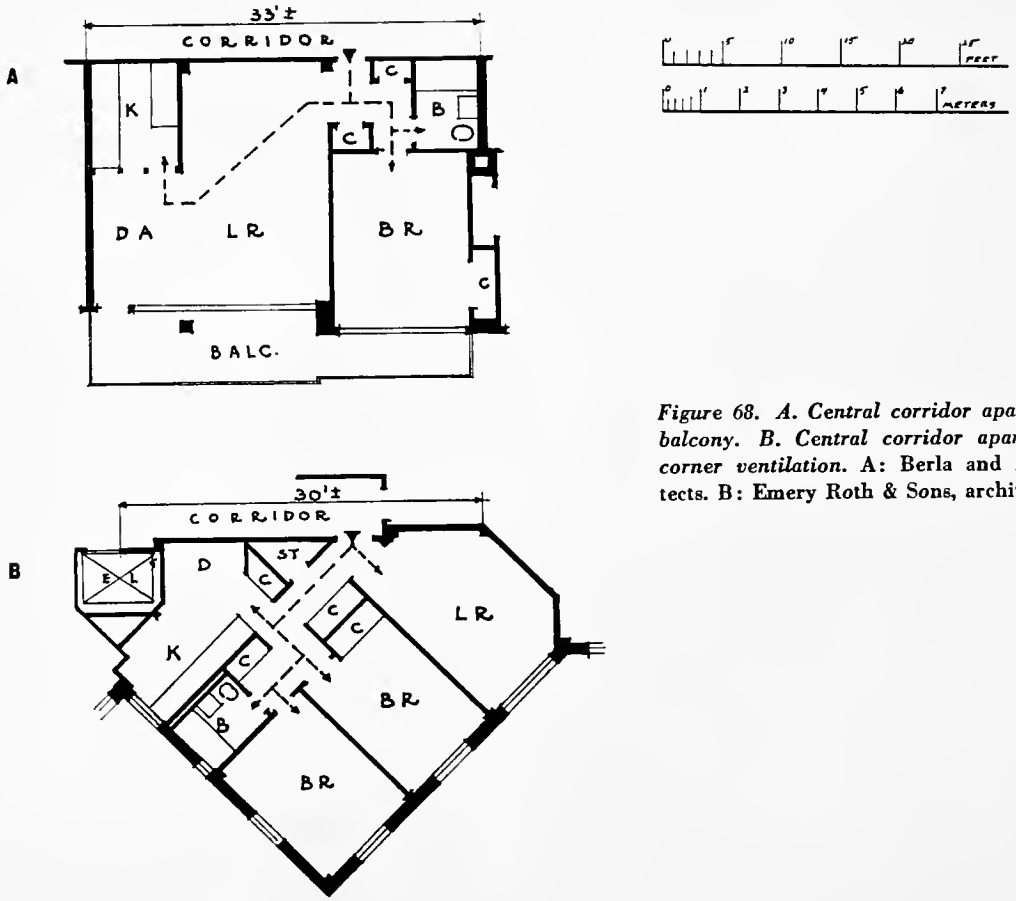


Figure 68. A. Central corridor apartment with balcony. B. Central corridor apartment with corner ventilation. A: Berla and Abel, architects. B: Emery Roth & Sons, architects.

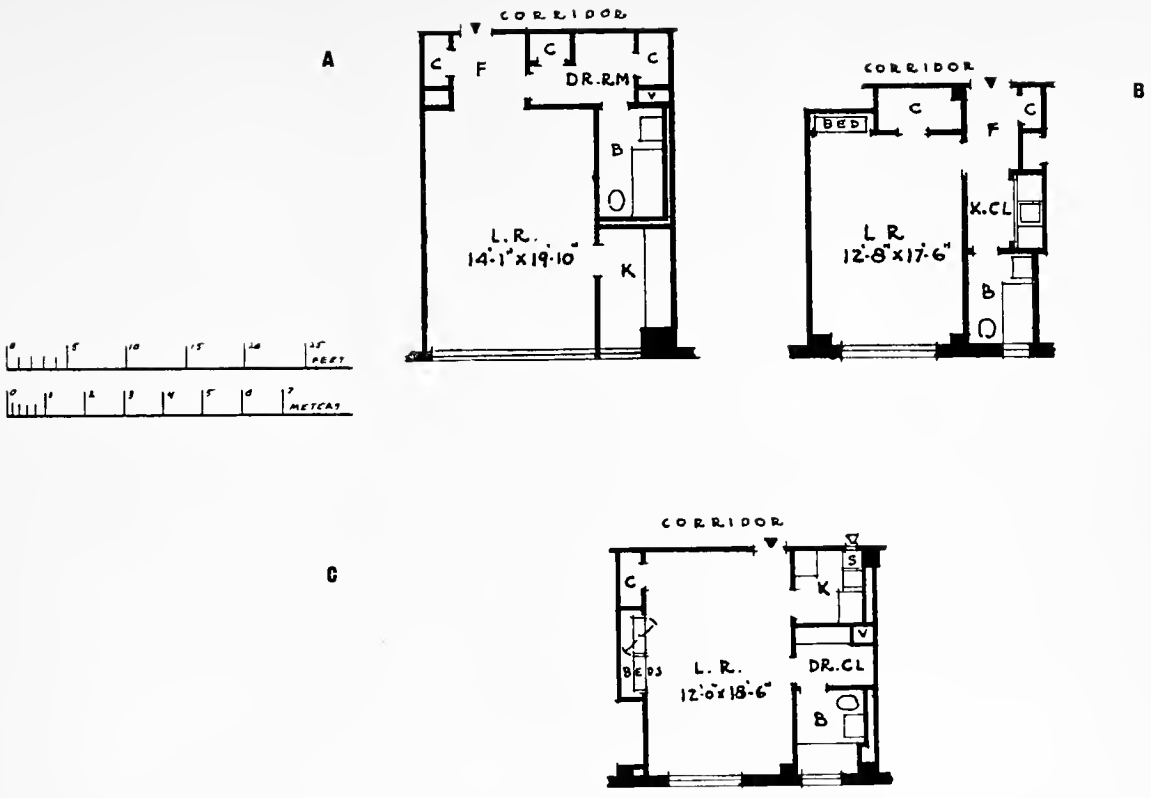


Figure 69. "Efficiency" units. A: Mayer & Whittlesey, Skidmore, Owings & Merrill architects. B: Sugarman & Berger, architects. C: Eugene Henry Klaber and Ernest A. Grunsfeld, Jr., architects.

This unit has privacy of access to all rooms. Obviously this type of plan requires a sizable terrain. The layout is complicated and may be expensive.

"Efficiency units" If an apartment requires moving of furniture whenever you wish to eat or sleep, it is said to be efficient. Well, some people like them, so we give three such plans (see Figure 69). A has a good kitchen and good dressing space. B is the only one of the three in which the living room is not exposed to view when the entrance door is open. Its kitchen strip is poorly located and dressing must be done in the living room. In C the kitchen is fair and has a servidor compartment, dressing space is somewhat cramped but otherwise good; the beds mounted on pivoted slab doors are a good feature. Take your pick!

Two-level apartments In an elevator building, if it is desired to have stops only on alternate floors, a highly desirable type of two-level unit is possible, the so-called "maisonette." A good one is shown in Figure 70. It affords excellent privacy and outdoor space, but possible danger

of this type of unit is fire on the lower floor. Here, however, there is the possibility of an emergency exit to the adjacent balconies. Figure 72 shows a much touted sacred cow. It is needless to expatiate on the many defects in this arrangement, such as the corridors in which children sleep. Suffice it to note that the lighting is entirely inadequate. Diagonal lines indicate the maximum penetration of sunlight on December 21, on the assumption that the rooms in question face due south, which only one could possibly do. In overcast weather almost 60% of the dwelling area will be enveloped in cavernous gloom. An excellent dwelling for moles!

Storage rooms Tenant storage space is one of management's prime headaches. Usually it is provided in the basement. Common storage rooms mean access with an attendant, circulation of vermin, and frequent complaints of pilferage. Individual cubicles take up much space; some will be empty, some will be overcrowded, and all are unguarded and duck soup for anyone who knows how to pick a lock. Tenants dislike basement storage, and some women are timorous about going downstairs. It is much preferable to have each tenant's storage space on his own floor. This can be arranged readily in the "blind corners" where the wings of a building intersect. Four solutions appear in Figure 71. A is an excellent plan from a Y-shaped building. B shows the intersection of wings of a Tee unit. There are five storage rooms for ten apartments, which means either sharing the cubicles or some tenants without space. The storage space is readily available, but the tenants must leave their quarters to use it. C demonstrates that the same sort of thing is possible in a cross-shaped unit. In strip units, where there are no "blind corners," interior store rooms may be provided if the building is of sufficient depth, as in D.

If this discussion of the dwelling unit has been extended, it is because a good unit promotes good living more than any other single element of planning.

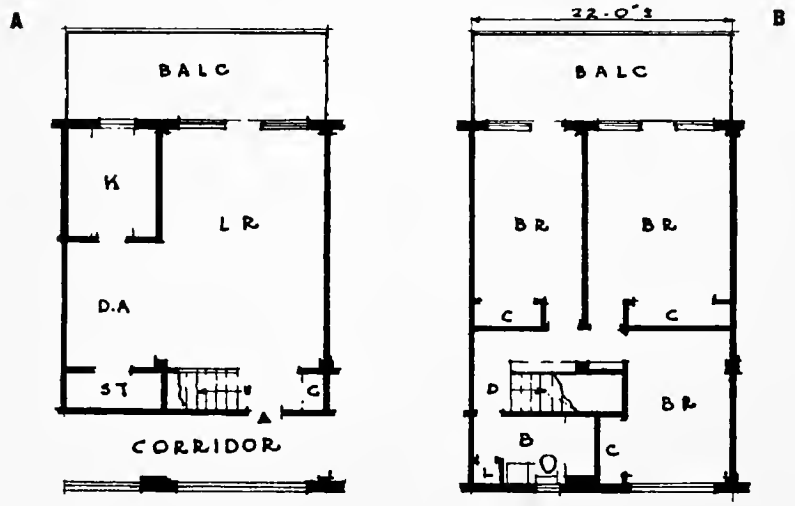
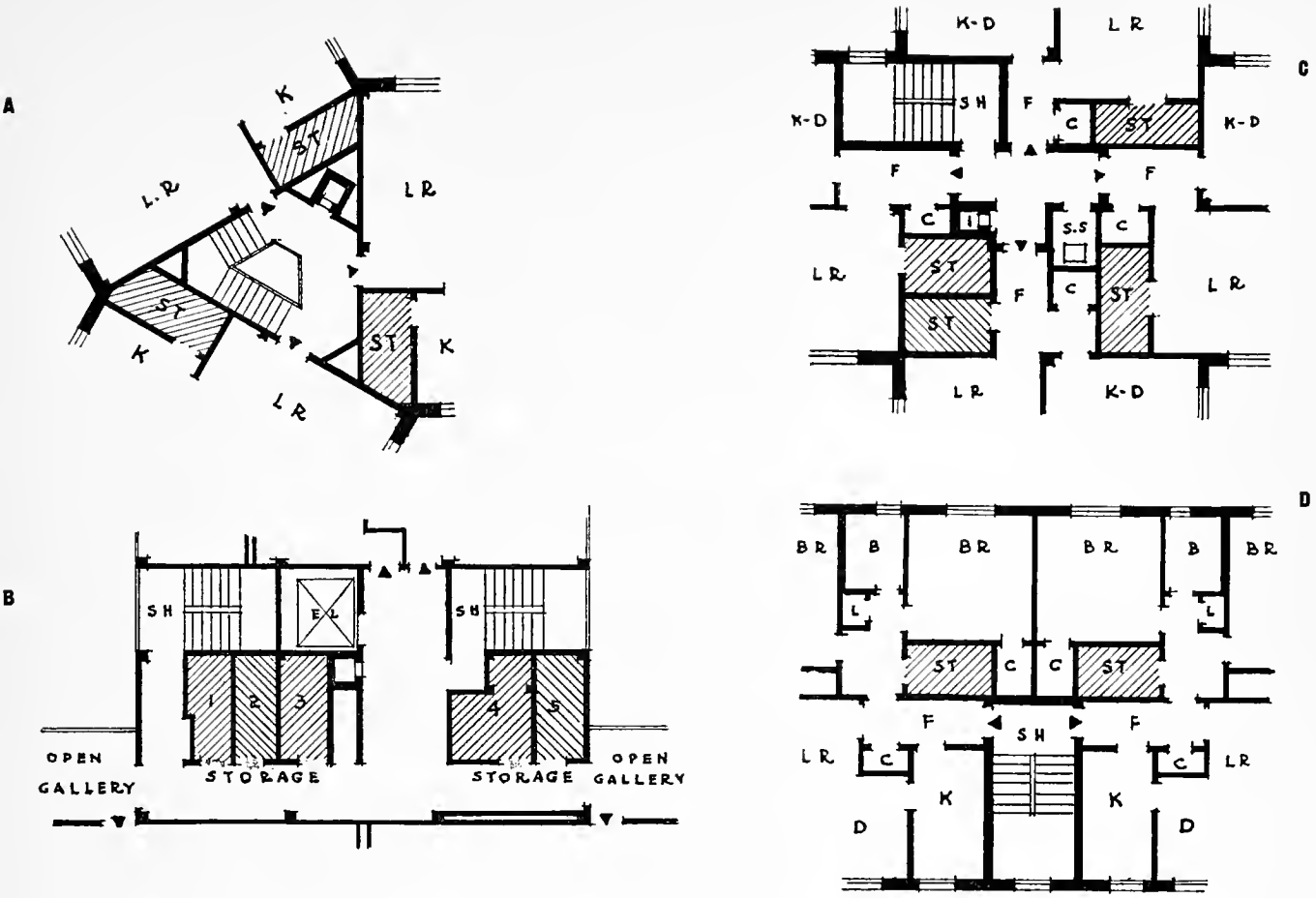
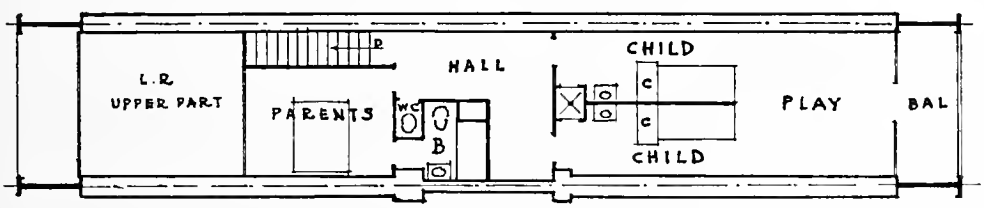
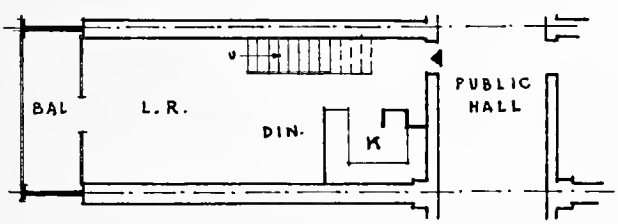


Figure 70 (left). Two-level apartment with good light and ventilation. Berla and Abel, architects. *Figure 72 (opposite page). Apartment reminiscent of the railroad flat.* LeCorbusier, architect.







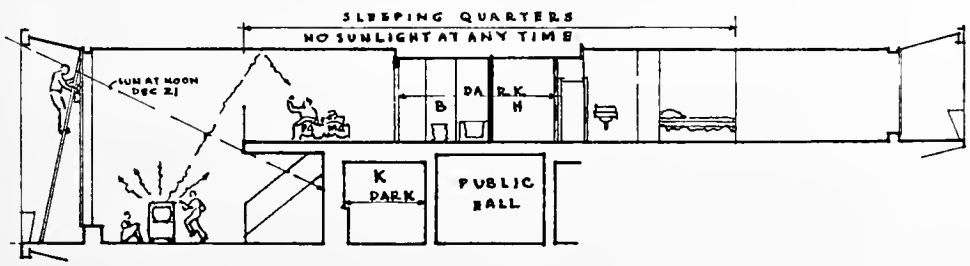
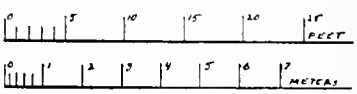


Figure 71 (above). Tenant storage. A. Y-unit walk-up building. B. Tee-unit elevator building. C. Cross-unit walk-up. D. Strip-unit walk-up. A: Skidmore, Owings & Merrill, architects. B: Skidmore, Owings & Merrill, architects. C: Eugene Henry Klaber, architect. D: Eugene Henry Klaber, architect.



Building Units

The term "building unit" designates a building or a section of a building comprising one or more dwellings with the necessary means of access and egress. It may include storage space, laundries, and heating plant, or these facilities may be shared by several units. The detached house, the row house, and flats have already been discussed in Chapter IV, and no further mention of them is necessary. Our concern here is with apartment buildings, containing a large number of dwellings with common means of exit, and with smaller units, juxtaposed to form a larger building.

In densely developed urban areas, where land is costly and properties limited in area, multi-story elevator apartments are common, and the architect has a limited range of possible layouts to consider; indeed, the shape of the lot and the economics of building virtually determine the layout. On larger and less expensive parcels of land, especially with walk-ups, he has a greater opportunity for variety of layout. In practice, the majority of building units have simple geometric forms in plan, and the buildings are combinations of these units or their variants. Ordinarily unit meets unit at a straight line. Where the resultant assemblage is satisfactory in plan, there is no objection to this. In planning a group of buildings, architects have a tendency to produce a limited number of well studied unit plans and apply these in various combinations to the plot plan. Sometimes the result is good, sometimes there are corners here and there where conditions of outlook, ventilation, or appearance are unsatisfactory. Too many architects just let it go at that, and do not realize that those bad corners require special study, perhaps a different type of unit. In such cases they should beat those lazy tee-squares into action and solve the problem rather than ignore it. After all, the objective is good planning throughout the project; not even a well designed unit is sacrosanct!

Before discussing the common forms of unit in detail, it is well to consider the characteristics of a good building unit layout:

1. As large a proportion of the gross area as possible should be given over to the net area of rooms and closets, as little as possible to corridors, halls, stairs, elevators, walls, and partitions. There is no universally

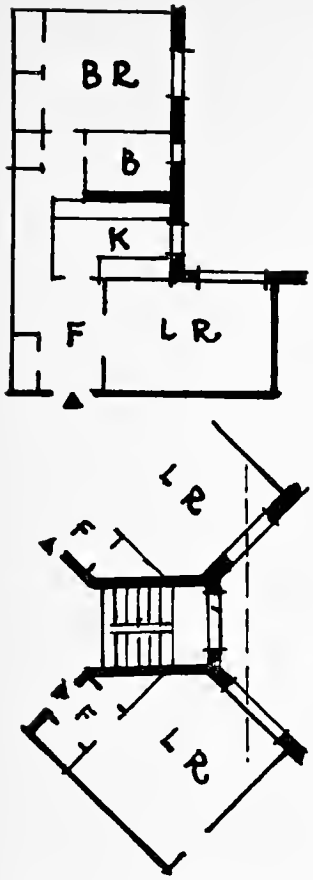


Figure 73 (above). Re-entrant corner with good privacy but poor ventilation (top) and with stair hall as separating element (bottom). Figure 74 (below). Unacceptable arrangement (near right) and passable arrangement (far right).

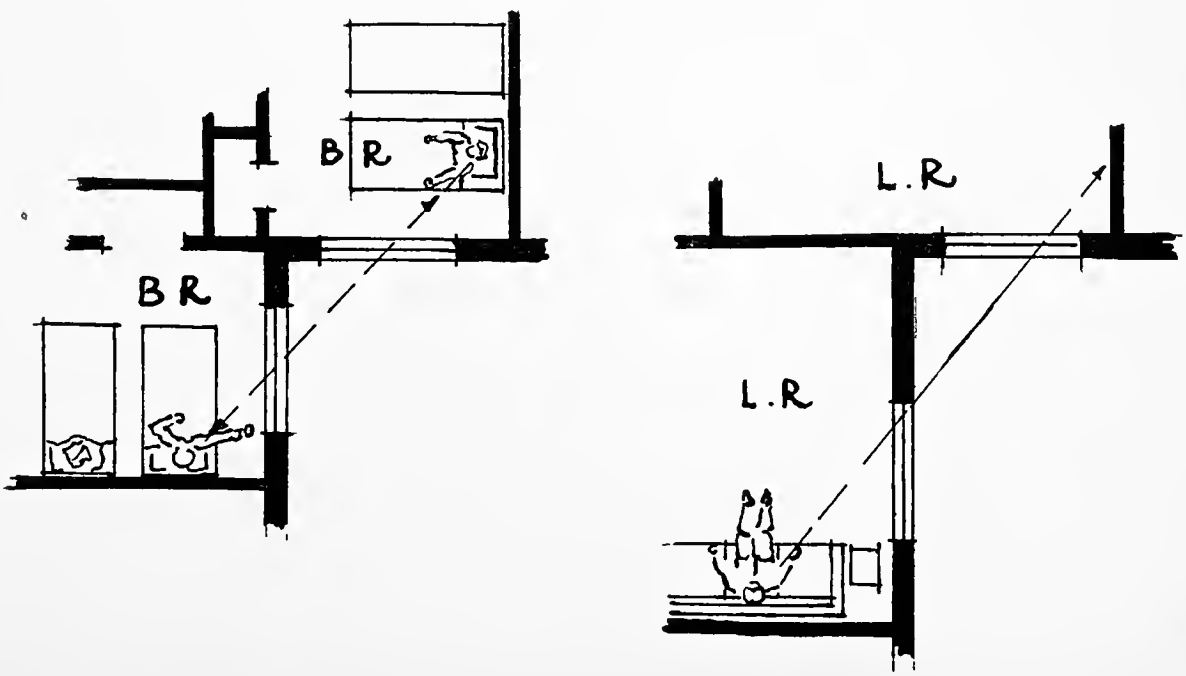
applicable criterion; thus in elevator buildings it may be necessary to have larger public space in order that more units may be served by a given number of elevators. If, however, the net usable area in the dwellings falls below 60% of the gross, the plans should be studied further to see whether any waste space can be eliminated or whether a different type of unit should be used. When 40% of the total area involves capital cost, annual charges, and maintenance, producing no direct income, it is worth a little study.

2. The layout should permit simple structural framing and avoid jogs and offsets in the partitions which increase the cost of finish. Where possible, kitchen and bathroom fixtures should be served by a single plumbing stack. On the other hand, no good plan should be ruined to achieve this end. In elevator apartments the added cost per dwelling of a second stack is not prohibitive.

3. It is desirable to have natural through or corner ventilation in all apartments. This is usually possible in walk-ups, sometimes in six-story elevator buildings, seldom in those which are higher.

4. At re-entrant corners of a unit plan special attention should be given to obtaining visual and auditory privacy between adjacent dwelling units. Bedrooms should not flank the corner; and living rooms may flank the corner only if the windows are arranged so as to afford some visual protection. Kitchens adjacent to the corner are not objectionable. One solution to this problem is to design a dwelling unit going around the corner. This does the trick but creates a pocketed layout difficult to ventilate. Another method is to introduce an intervening element such as a stair or elevator hall. See Figure 73.

There are eight types of building unit in common use; strip, ell, tee, Y, zee, cross, radial, and gallery. Each will be discussed briefly.



strip units

This type of unit has many advantages for walk-up apartments. With two dwellings per floor it affords through ventilation, and a wide angle of vision from the windows. There is no "blind" space in the plan. It assembles readily, either as a straight line building comprising identical units or as a link between ell, tee, zee, or cross units, which, used in pairs, may create narrow courts between projecting wings.

If more than two dwelling units per floor are planned, ventilation is compromised in some or all of the apartments. This is illustrated in Figure 76, A, B, C, and D. Note that in D through ventilation is secured for two units by making apartments 1 and 4 non-bedroom layouts. A small proportion of such building units in a project may be acceptable, but ordinarily no walk-up project would require 50% of "efficiency" units.

Where local building codes require two interior stairs, the cost per dwelling unit may be prohibitive if there are only two per floor. In that event it is better to use a cross or a zee unit, rather than a strip with four apartments per floor. Ventilation would be better, and although public space might be increased, waste area in the apartments would be reduced.

Figure 77 is a good example of a two-bedroom layout in a strip unit. It has privacy of access to all rooms, and the framing is simple. This is obtained at the added expense of one plumbing stack. If only one were used, passage from bedrooms to bath would be across the entrance foyer.

ell units

On small properties, where conservation of open space is important, the ell unit is a useful form for turning corners in the building plan. With three apartments per floor, two will have through ventilation and one will have corner ventilation. This unit is seldom used alone as a complete building and is not adaptable for elevator buildings.

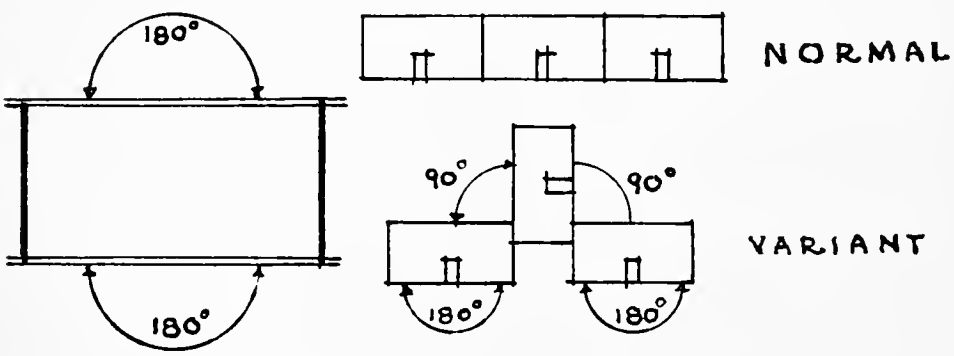


Figure 75. Assembly of strip units at two ends with 180° vision and no blind space (left). Normal assembly and variant assembly of strip units (right).

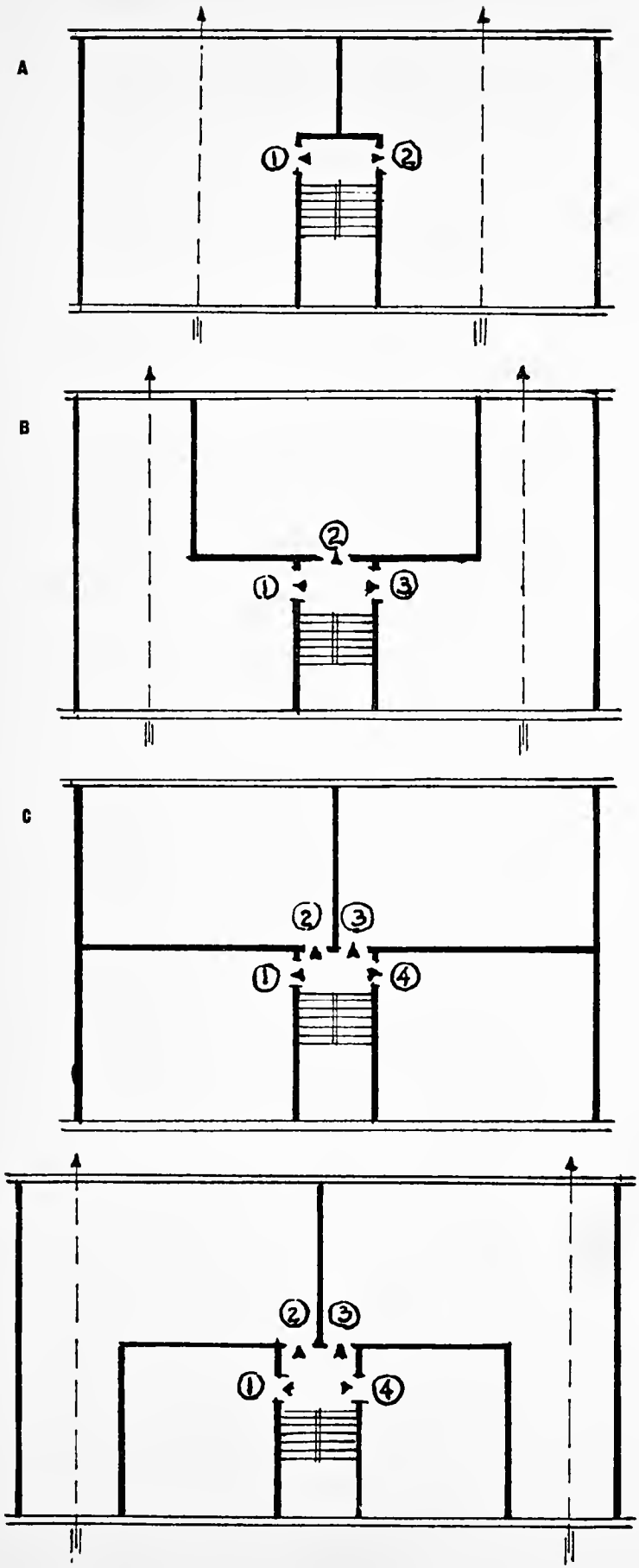
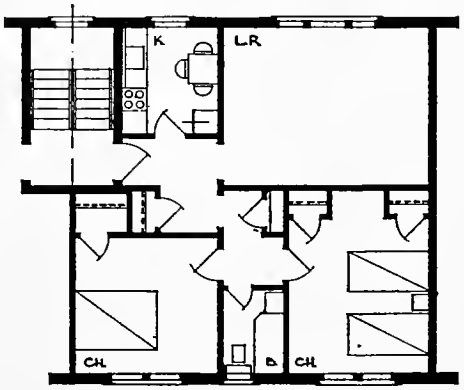


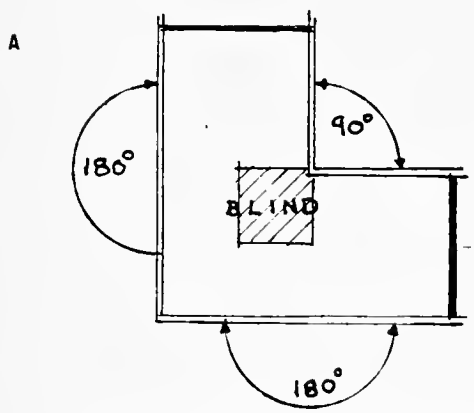
Figure 76 (left). A. Through ventilation of all units. B. Through ventilation for two out of three units. C. Through ventilation for none of the units. D. Through ventilation for half the units; the others are pocketed. Figure 77 (below). Typical two-bedroom strip unit. Federal Housing Administration.



A single staircase may be located at the re-entrant angle or on one of the long sides. The former affords a somewhat simpler layout and uses the "blind" space to advantage (Figure 79 A and B). A requirement of two staircases might produce a layout as shown in Figure 80-A. This arrangement is none too good; the stairs are close together, and if the main hall were full of smoke, passage to the secondary stairs would be dangerous.

Four apartments per floor means one split wing with the consequent compromise of ventilation (see Figure 80-B).

Figure 78 (below). A. Assembly of ell units at two ends. Blind space occupies one quarter of the intersection. B. Angle α should not exceed 60° unless the court width is 1.25 times the building height.



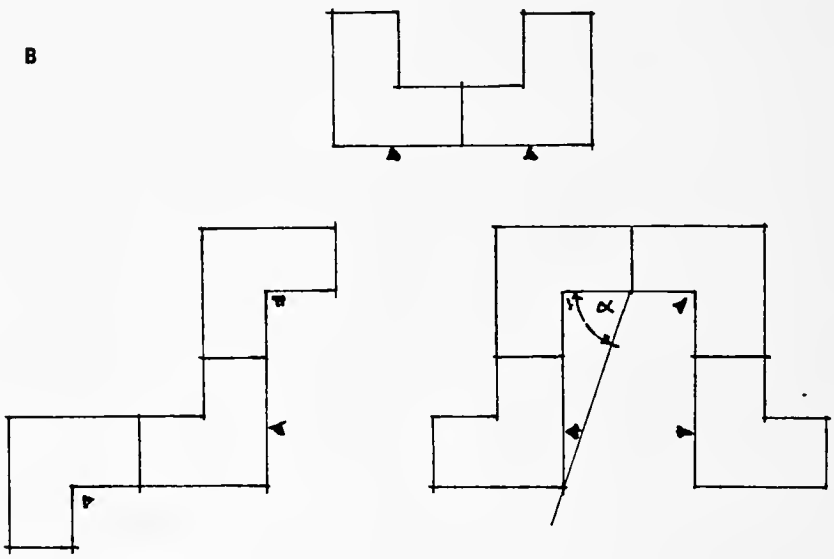
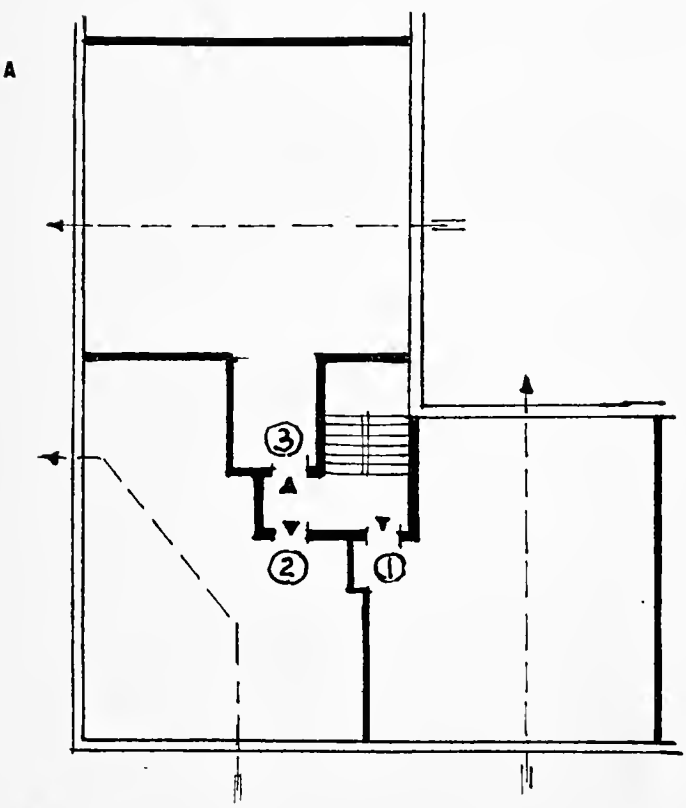
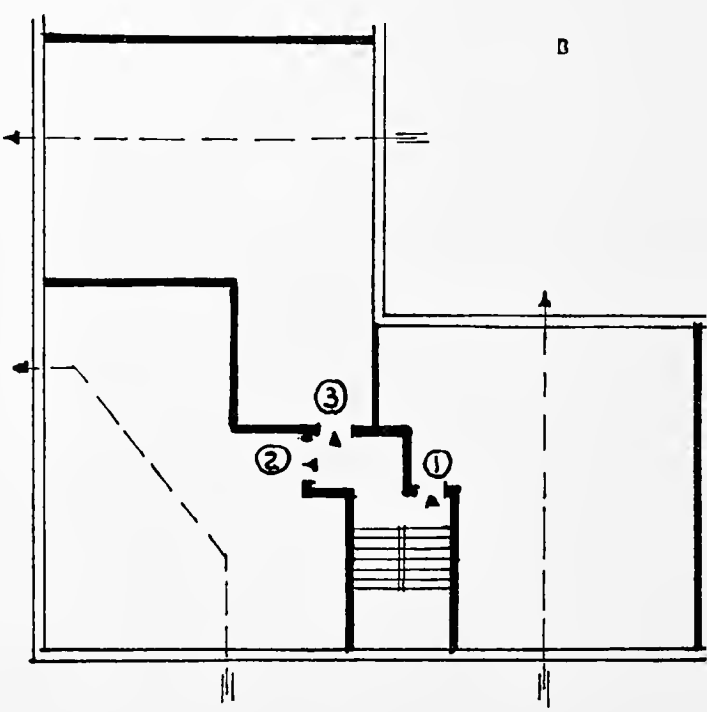
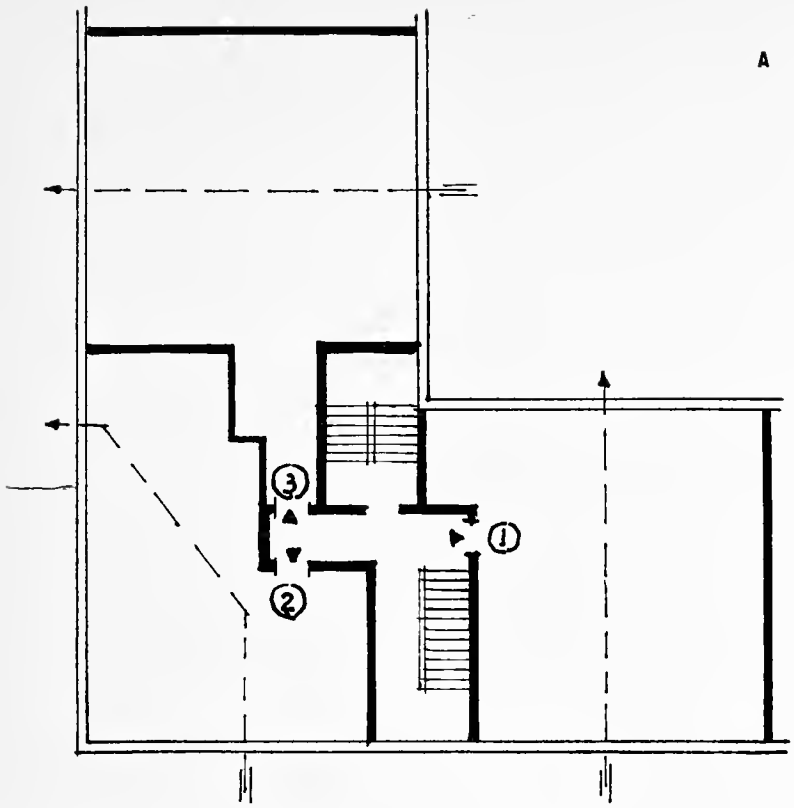


Figure 79 (below). A. Stairs at re-entrant angle. B. Stairs at one side. In both A and B two thirds of the apartments have through ventilation and one third have corner ventilation.







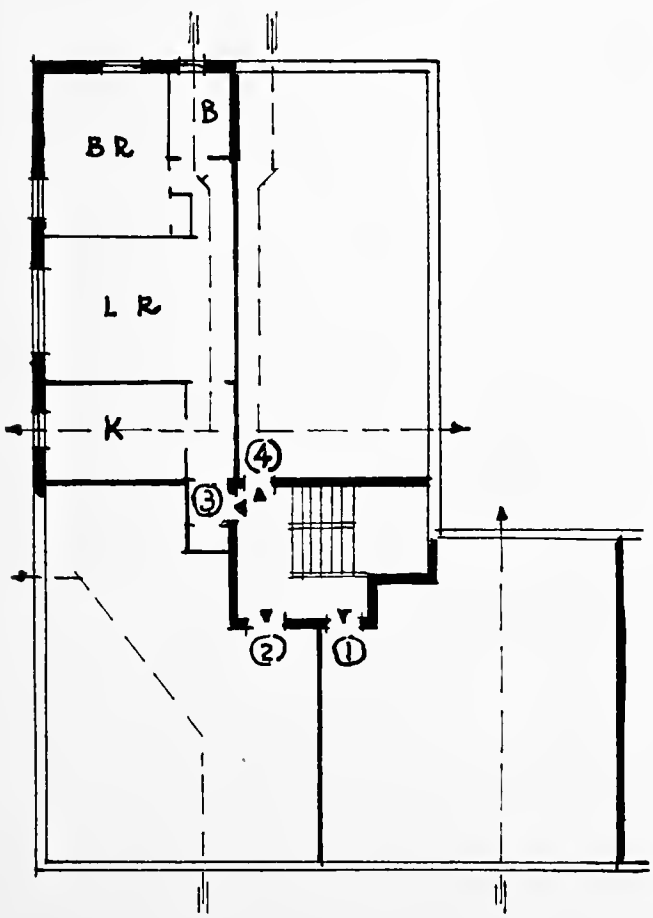
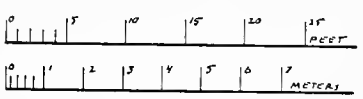
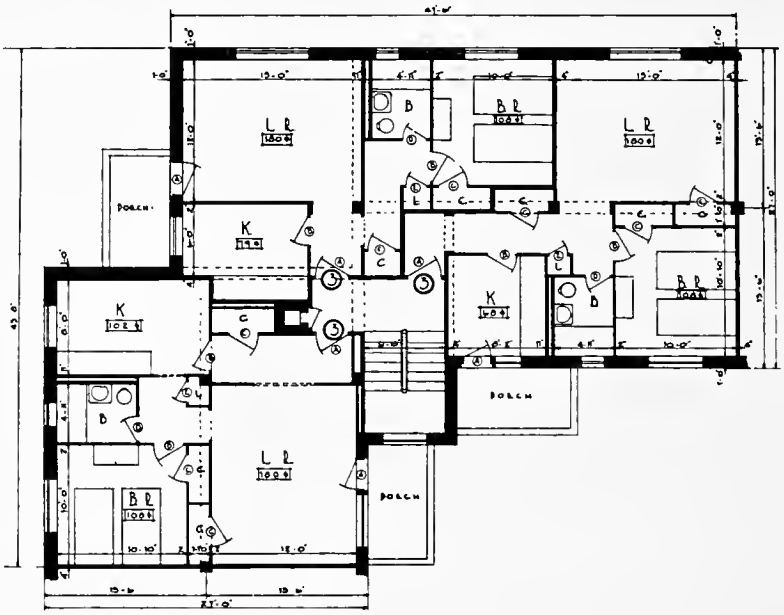


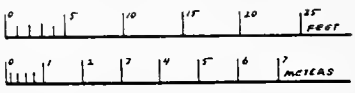
Figure 80. A. Plan when two stairs are required. B. With four apartments per floor in end unit, one has through ventilation, one has corner ventilation, and two have poor ventilation.



A

Figure 81. A. Stairs at the re-entrant angle. B. Stairs on one side. C. Variant of ell unit with balconies. A: Federal Housing Administration. B: Federal Housing Administration. C: Housing Division, Public Works Administration.





Three detailed examples of ell units are shown in Figure 81. In A the staircase is in the corner, in B on one side. In both, the living rooms are on the long sides on the assumption that they face streets. C is an interesting variant with private balconies. Note that at least one balcony is lost on the first floor in order not to block the entrance door.

tee units

As compared with the ell unit, the tee has the advantages of three ends where it may be assembled with other units and the possibility of through ventilation for all three apartments per floor. It is somewhat more difficult to plan the dwelling units if there is a preferred outlook for the living room. Figure 83 A, B, and C are variants of this unit. Their merits and demerits are obvious. D is one of the best tee units of which we have knowledge; simple layout, excellent ventilation, little waste space. Figure 84 shows the problems confronting the architect in using this unit for elevator buildings. Evidently six apartments per elevator were necessary. Despite skillful planning, the difficulties of the split wing are apparent and only two of twelve units have thoroughly good ventilation. The admirable manner in which the double and remote exit requirement has been handled is worthy of note. There are only two fire-escapes, the other exit requirements are met by three interior stairs and two outside recessed stairs with fire balconies.

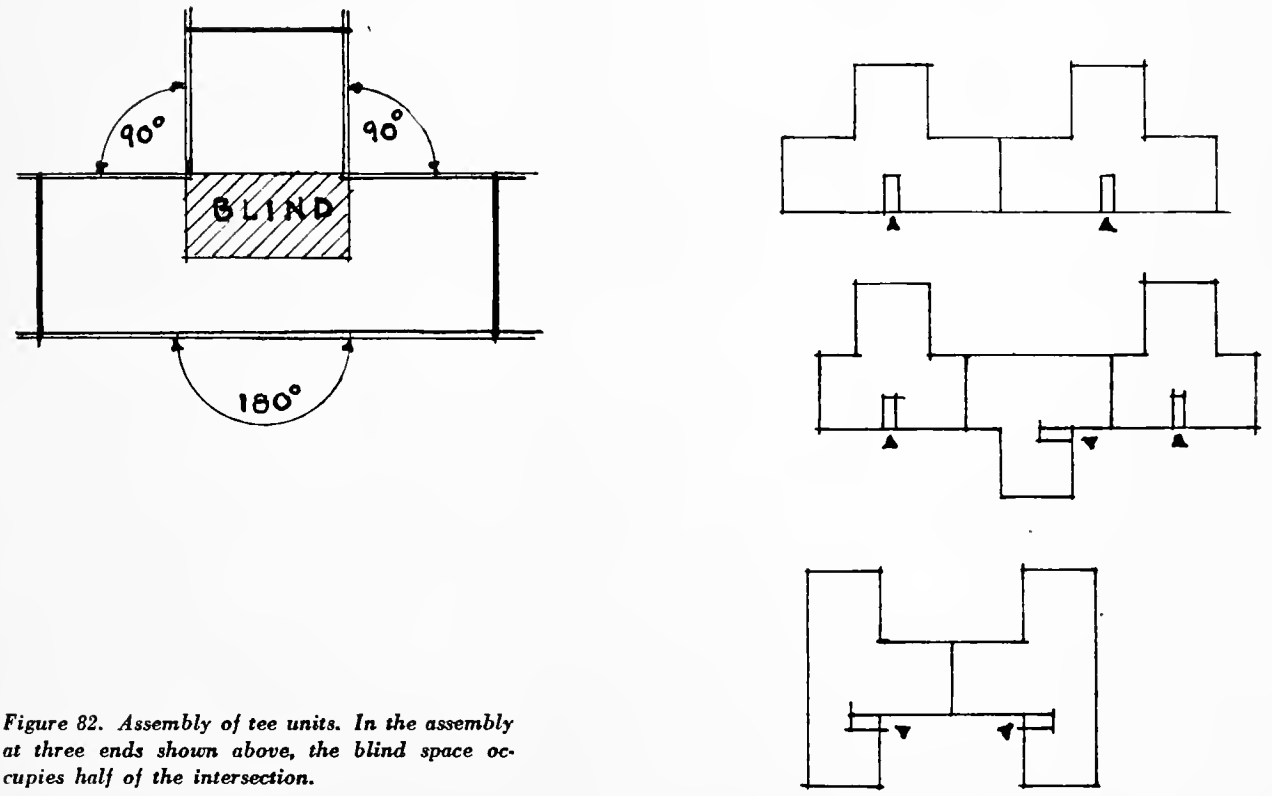
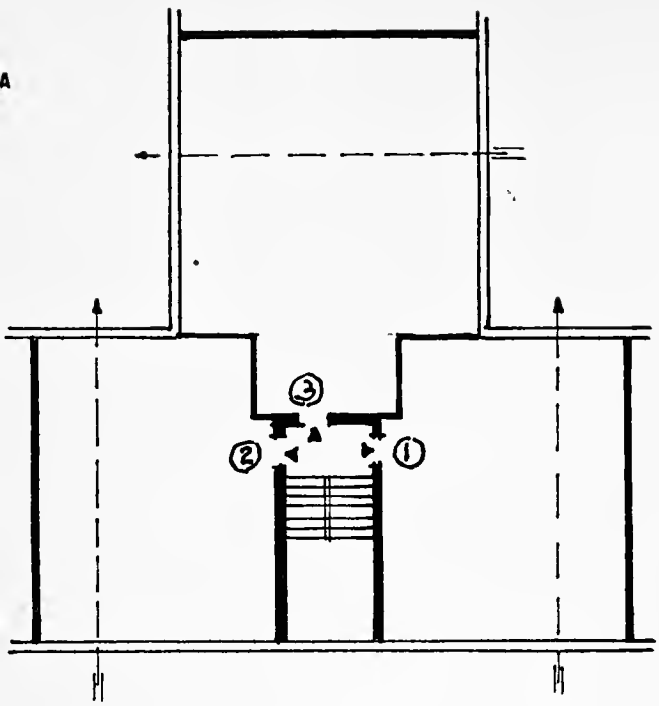


Figure 82. Assembly of tee units. In the assembly at three ends shown above, the blind space occupies half of the intersection.



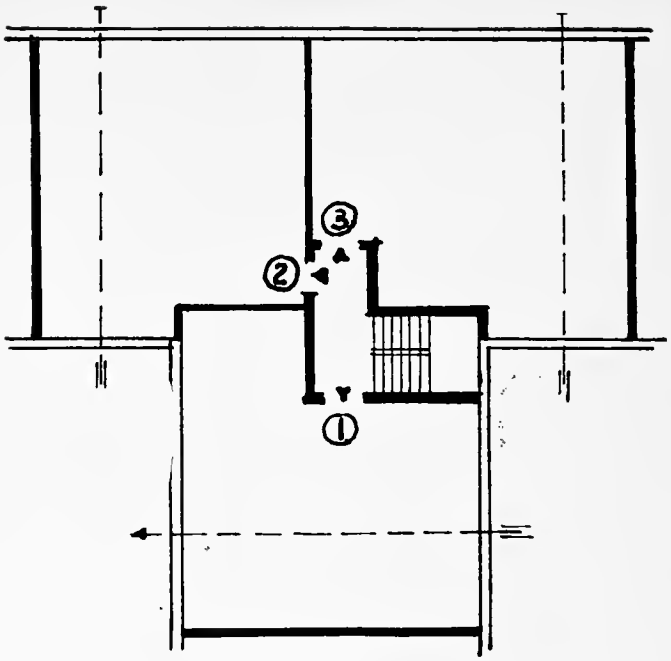
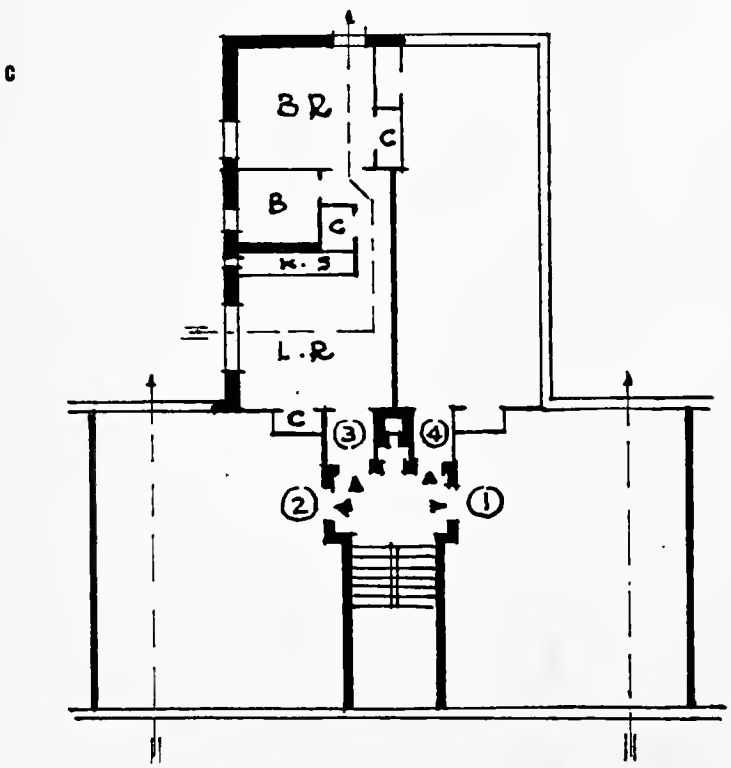
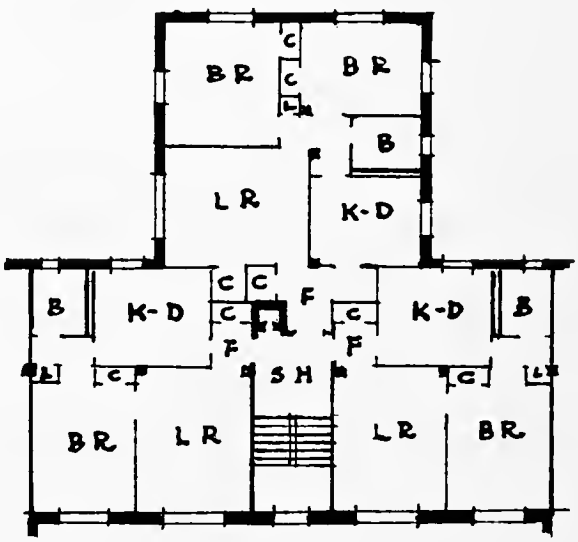


Figure 83. A. Stairs at center of crosswing. All units have through ventilation. B. Stairs at reentrant angle. C. One split-wing arrangement. Half the units have through ventilation, half have poor ventilation. D. The tee unit at its best. Archibald M. Brown, Horace Ginsbern, Charles F. Fuller, Richard W. Buckley, John Lewis Wilson, Frank J. Forster, and Will R. Amon, architects.





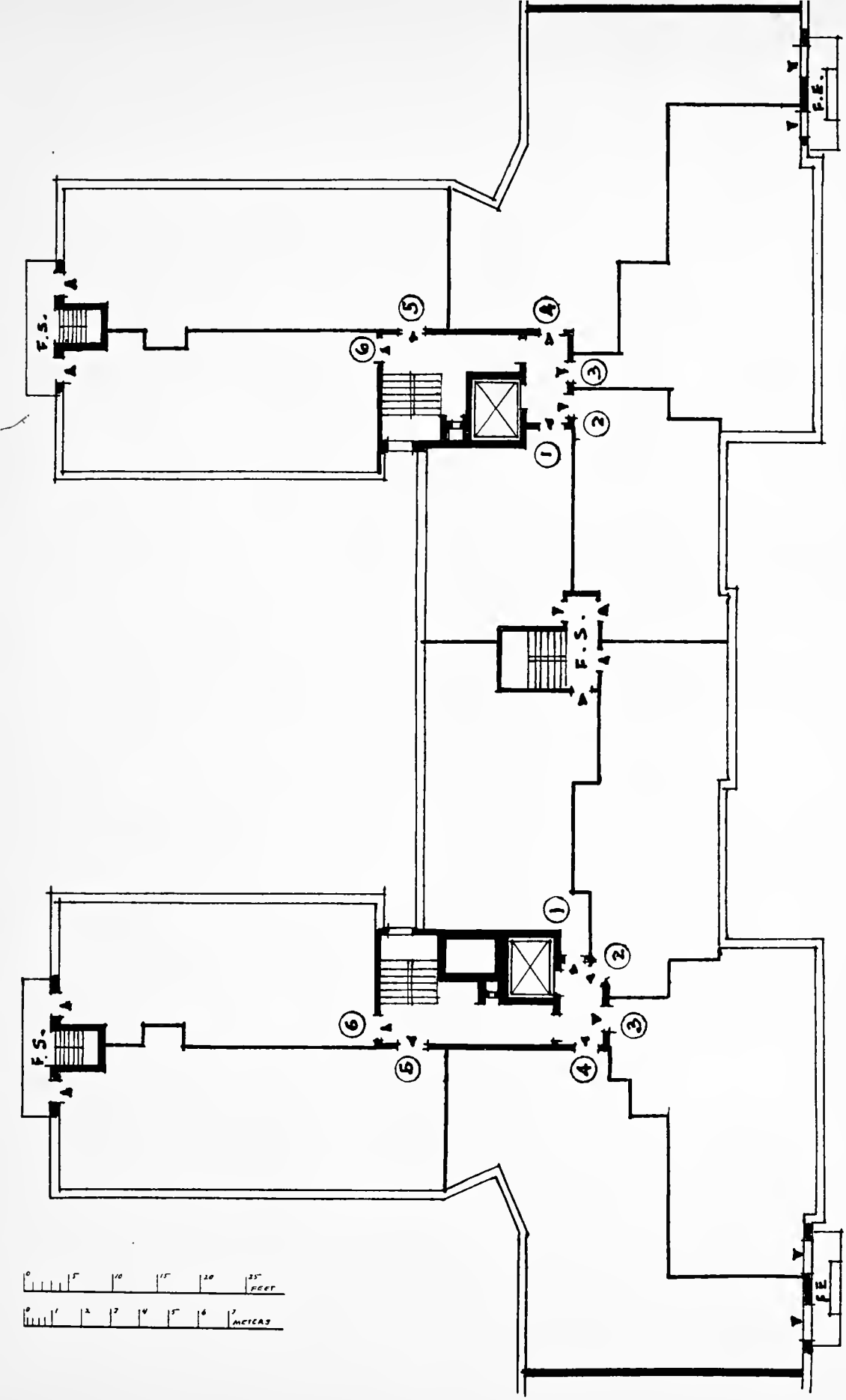


Figure 84. Double tee with split wings. Only one sixth of the units have through ventilation. Clarence S. Stein, architect.

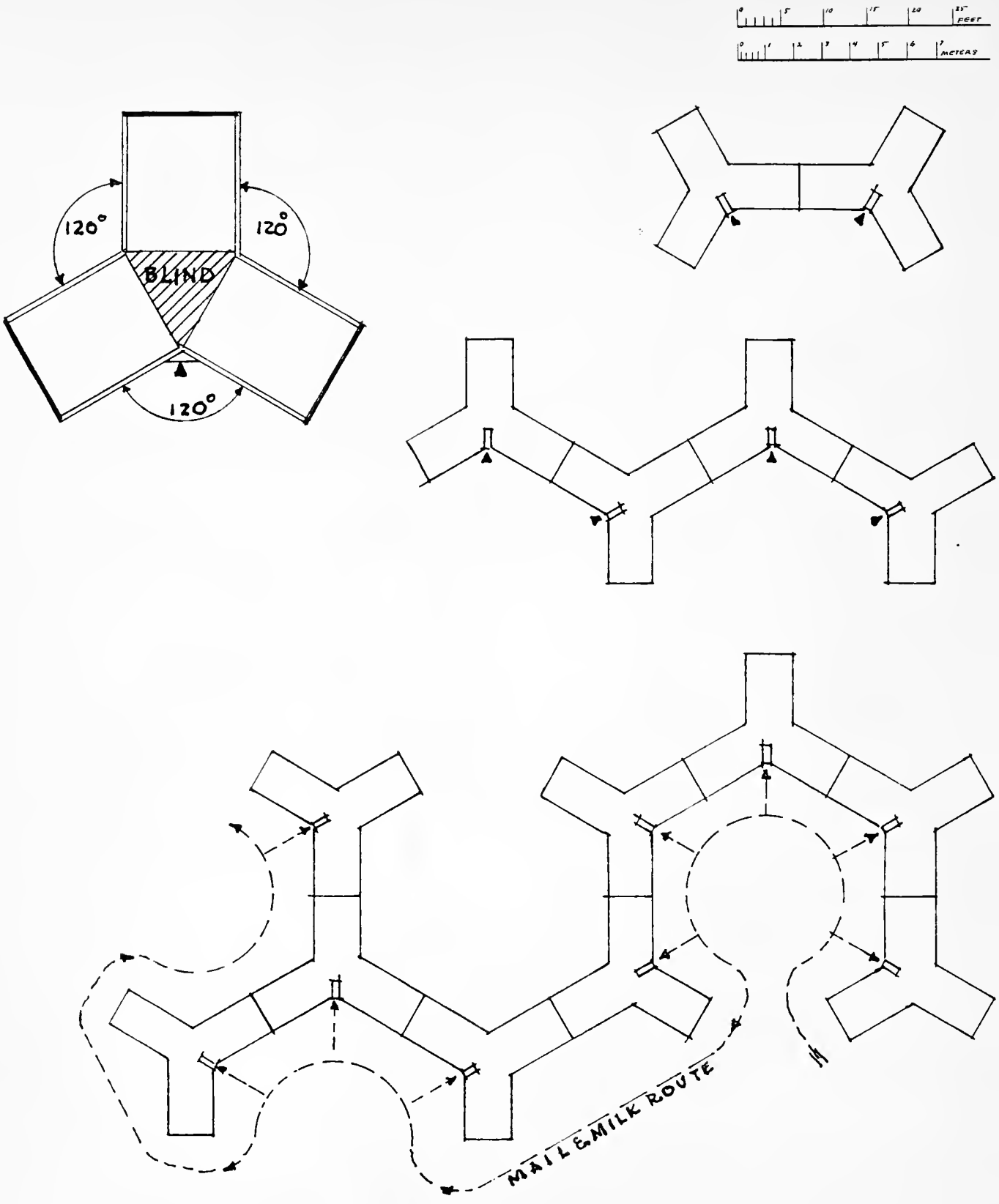


Figure 85. Assembly of Y units. Assembly is possible at the three end walls. The bottom sketch shows the Mad Hatter Gardens—how not to do it.

y units With wings meeting at an angle of 120 degrees, this type of unit (really a variant of the tee) affords admirable privacy and a wide angle of vision for all apartments. It also gives a pleasing variety in elevation, not only in mass but in the differences in shade and color which the angular pattern makes possible. Its use requires skill and restraint to avoid the appearance of being a planless jumble (see Figure 85). The detailed walk-up plan merits careful study. The dwelling unit plans have been skillfully designed and the manner in which the "blind" space has been used is admirable. The elevator plan shown has the curse of the split wing on four of five apartments—well, we've sung that little song before! See Figure 86.

Figure 86. A. Three-story walk-ups. All units have privacy and good ventilation. B. Six-story elevator building. Queensbridge Housing, New York. A: Hugh Stubbins architect. B: William F. Ballard, Henry S. Churchill, Frederick G. Frost, and Burnett C. Turner, architects.

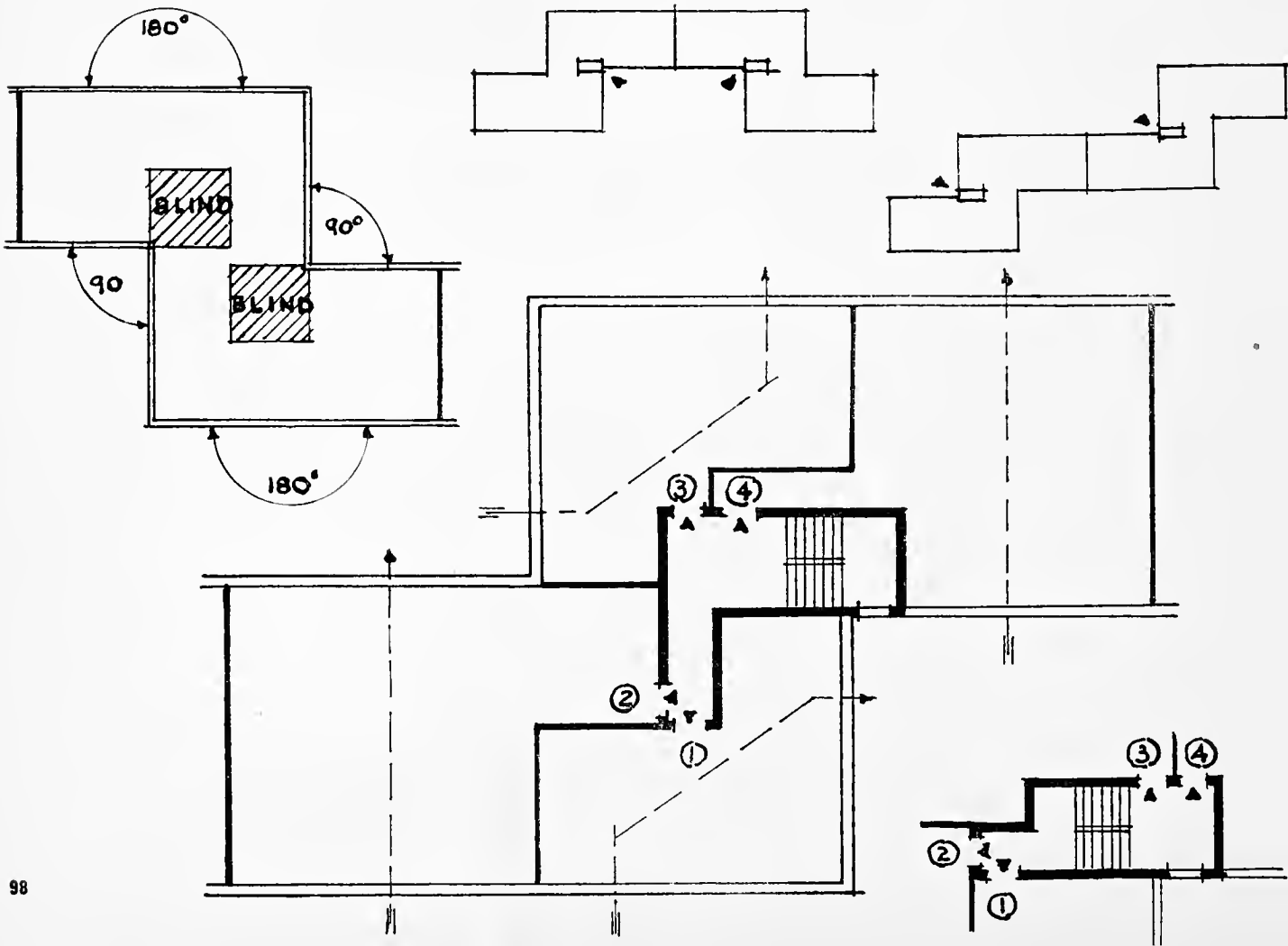
B

Although somewhat complex in plan, the zee unit is economical in first cost translated into rental per room produced. It has the same proportion of "blind" space as the tee, but since the blind areas are not contiguous, they can readily be used. With staircases at the re-entrant corners, an efficient plan results. A disadvantage is that the zee is comparatively long in one dimension, which may offer some difficulty in site planning. It is an excellent unit for opening up a group plan toward a favored orientation, and on hilly sites the stairs may readily be arranged to serve two apartments at each of two levels (see Figure 88). It is excellent for walk-ups and for elevator buildings with not more than four apartments per floor, but not of much use if more than four are crowded around the staircase-elevator core of the building.

zee units

The walk-up in Figure 89-A is found in Chicago, a city where service stairs are customary and where the code requires two "remote" exits. This requirement has been met with two main stairs and three service stairs. Had the old Chicago pattern of twin apartments been followed, four of each would have been necessary. The elevator unit with double stairs in B has four well-planned apartments without excessive public space.

Figure 87 (directly below) Assembly of zee units. Assembly is possible at two ends. Blind space equals half the rectangular intersection. Figure 88 (bottom). An arrangement when only a single stair is required. Half the units have through ventilation and half have corner ventilation. The small sketch shows an arrangement when apartments are at two levels.



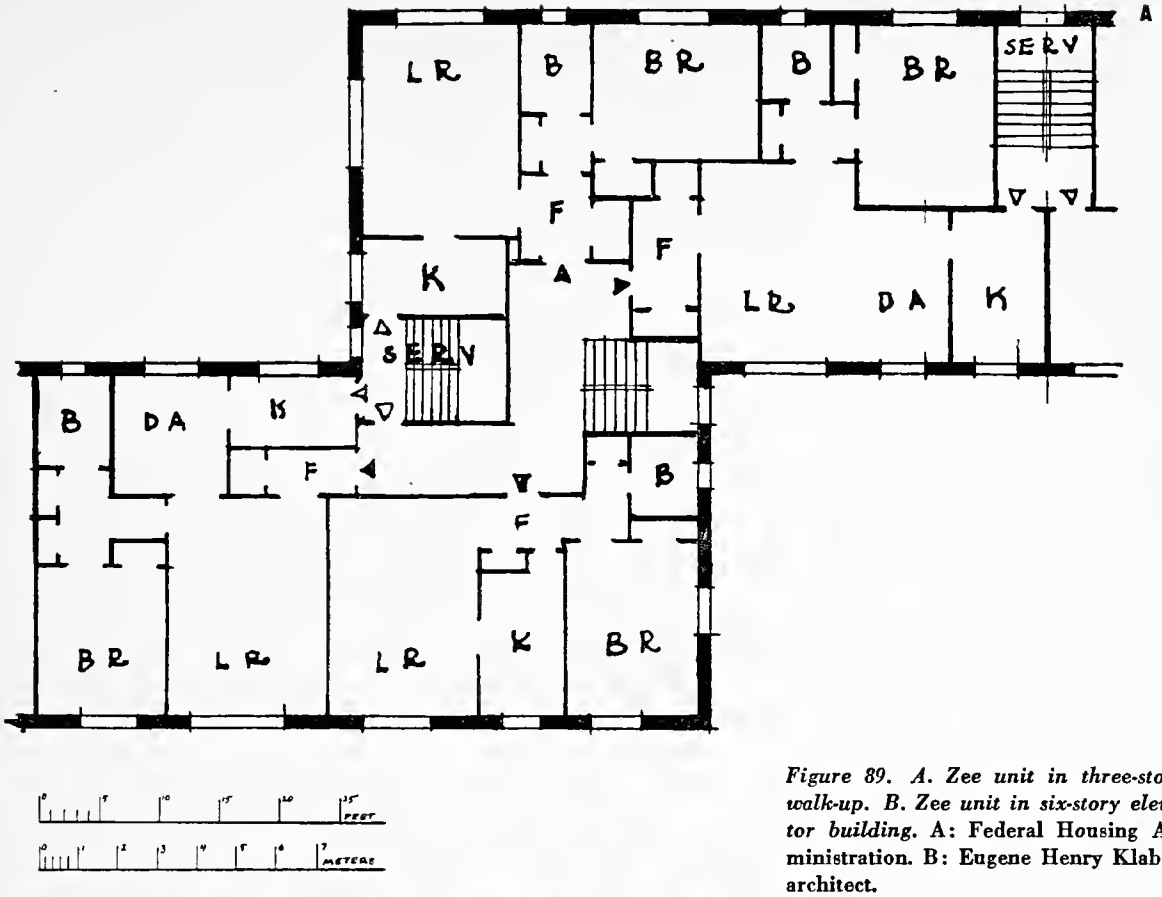
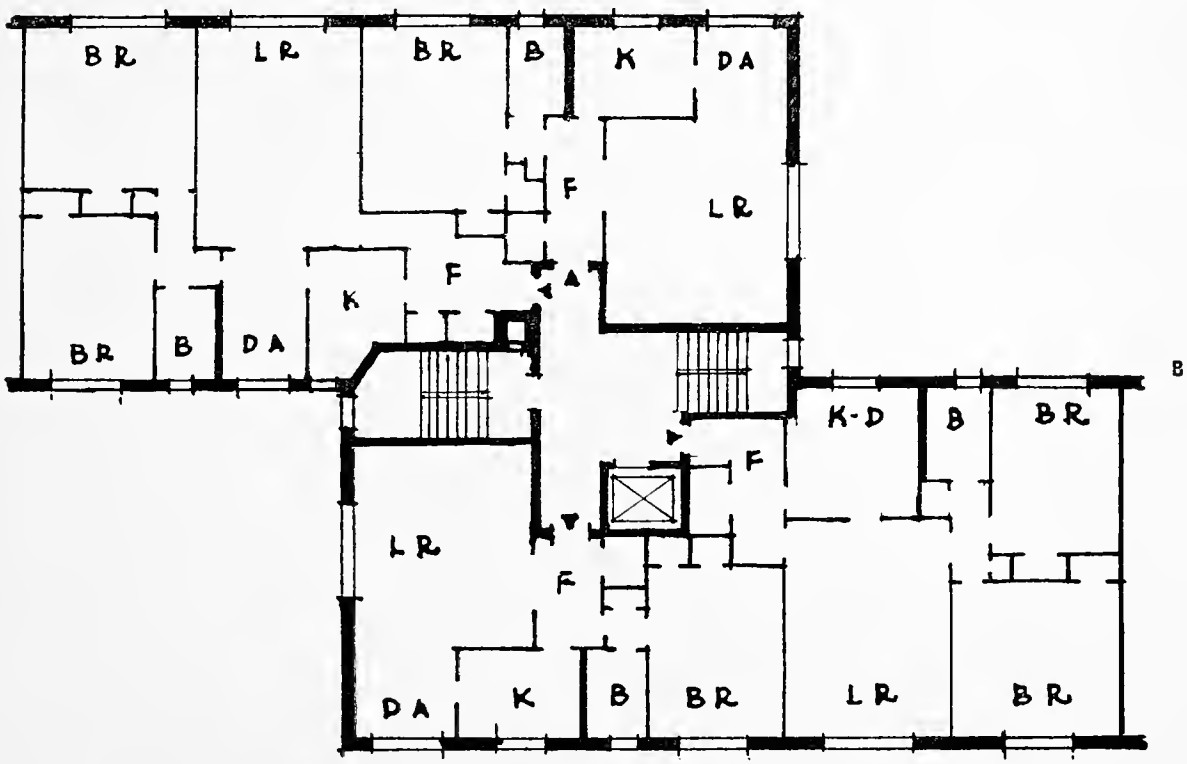


Figure 89. A. Zee unit in three-story walk-up. B. Zee unit in six-story elevator building. A: Federal Housing Administration. B: Eugene Henry Klaber, architect.

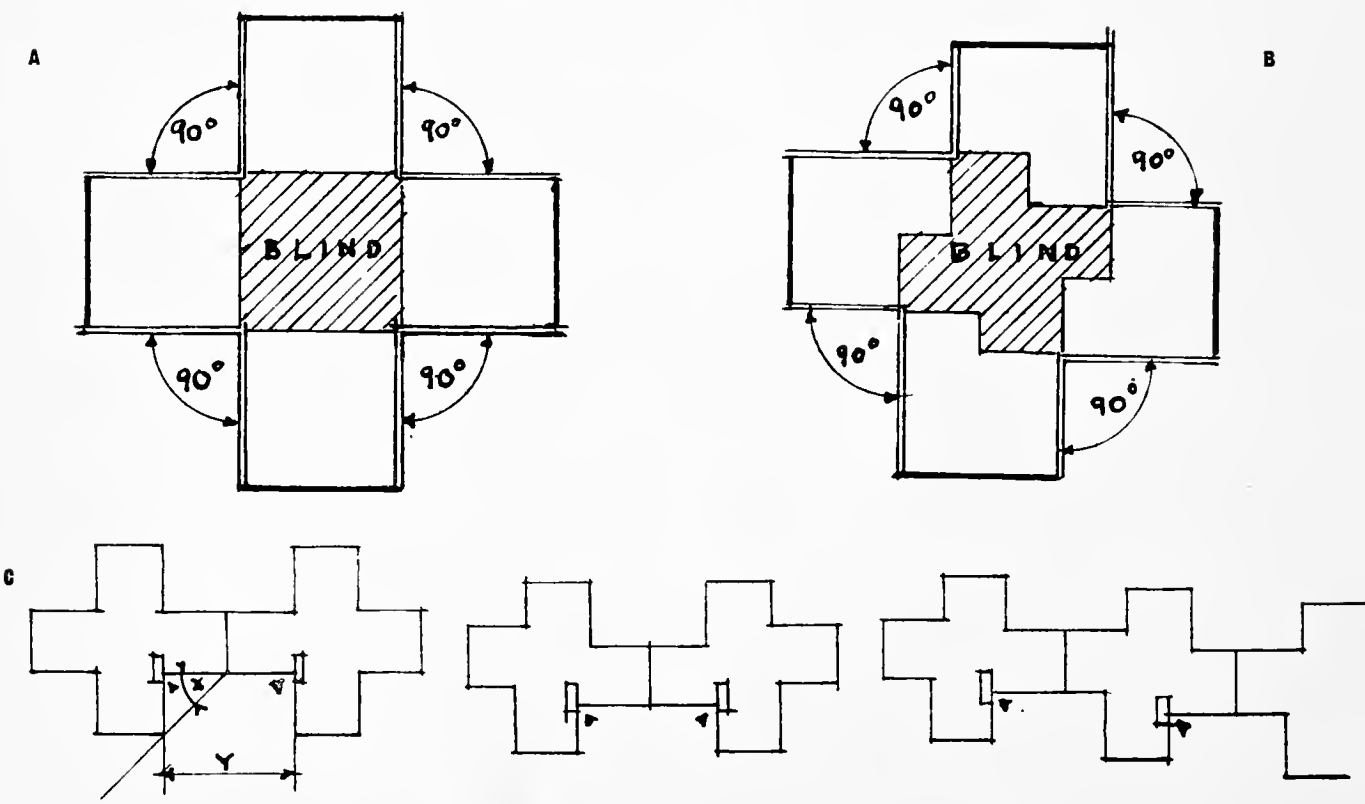


The same reasoning used for units already discussed if applied to the cross will demonstrate its usefulness as an element of planning. In practice it is resorted to frequently for elevator buildings both six-story and high rise. It has been used less often for walk-ups. This is because it has a central core and radiating wings which permit a large number of apartments per floor.

cross units

There are two principal variants, the straight cross and the offset cross. The latter is preferable in many respects, since it permits a more flexible layout and better use of the "blind" space. This is demonstrated in Figure 91, A and B. The offset cross plan has 326 additional square feet of area, of which 300 feet (an average of 75 per apartment) have gone into added dining space. Can the added capital cost be justified? In private development this will depend on whether or not the added rental obtainable for the three dining alcoves and increased kitchen area on each floor will exceed the added operating cost, taxes, and fixed charges. In public housing it can be justified if it affords proper housing for additional persons or if it gives markedly greater amenity. In the straight cross plan, dining must be

Figure 90. Assembly is possible at four ends of cross units. Blind space equals the rectangular intersection. A. Straight cross. B. Offset cross. C. Angle X should not exceed 60° unless Y equals or exceeds the building height.



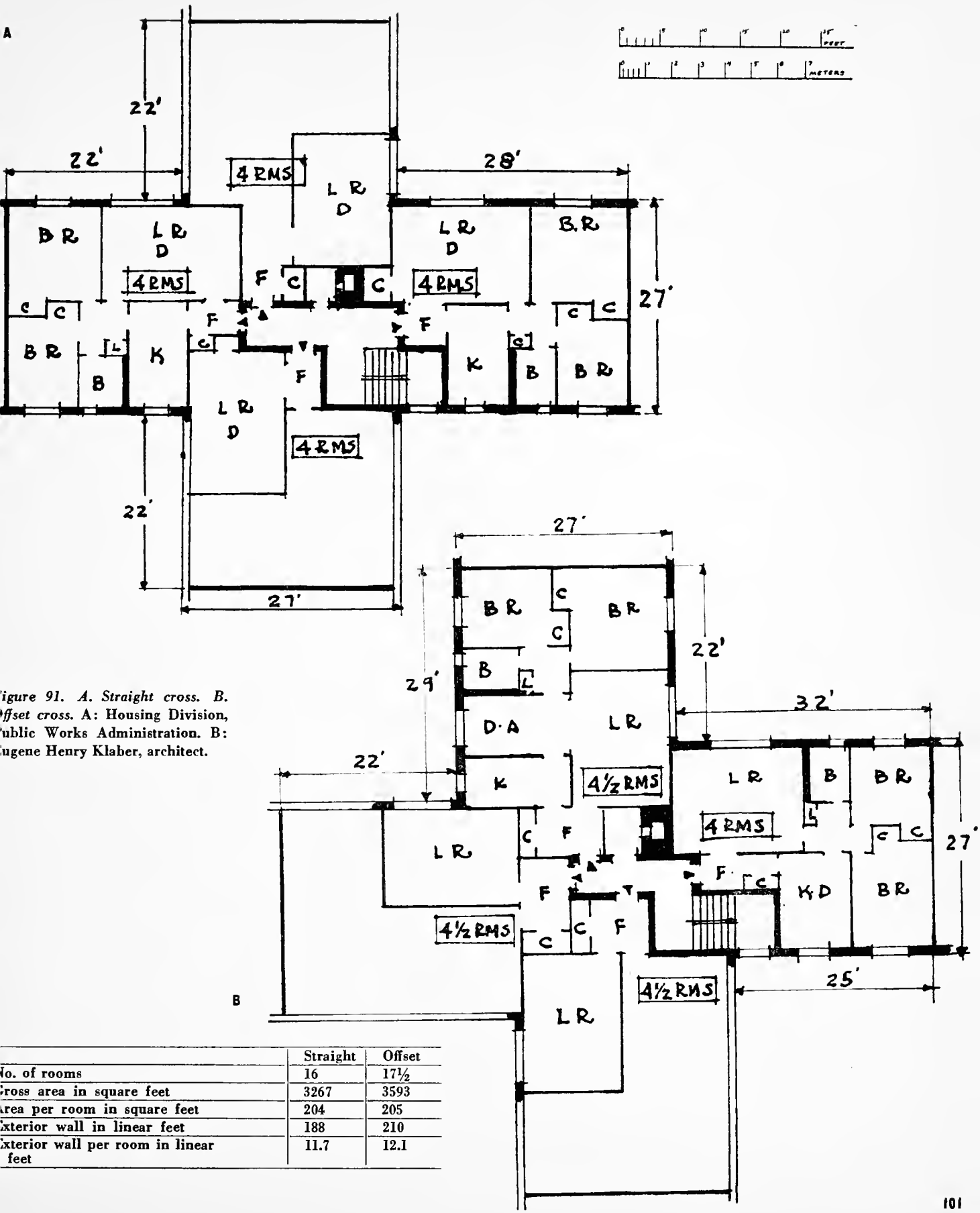
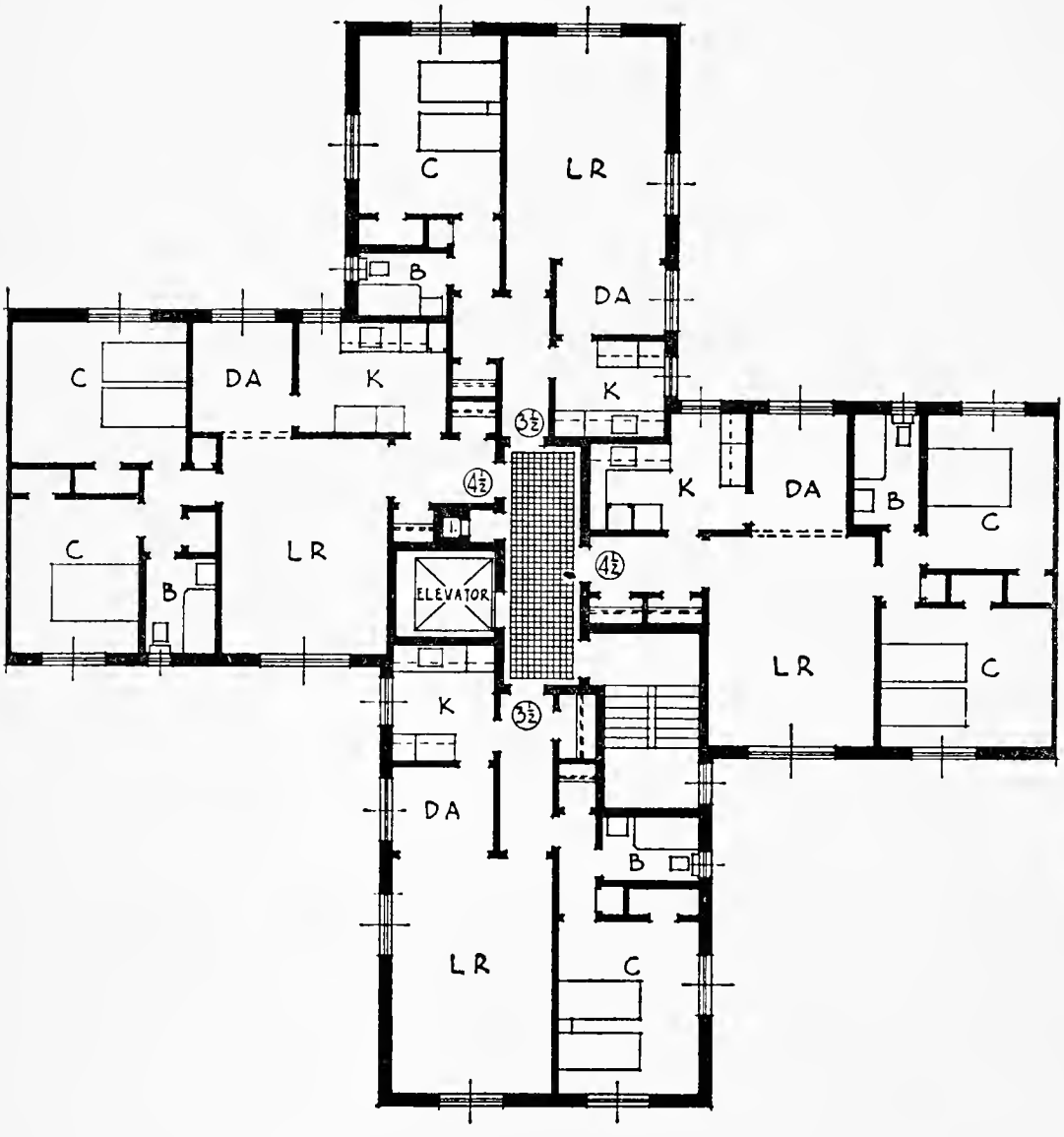
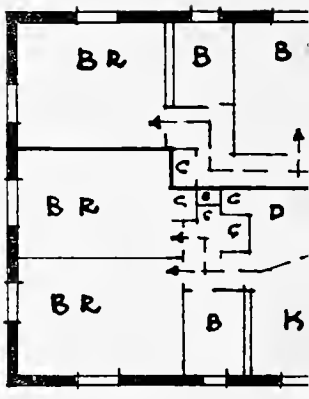


Figure 91. A. Straight cross. B. Offset cross. A: Housing Division, Public Works Administration. B: Eugene Henry Klaber, architect.

	Straight	Offset
No. of rooms	16	17½
Gross area in square feet	3267	3593
Area per room in square feet	204	205
Exterior wall in linear feet	188	210
Exterior wall per room in linear feet	11.7	12.1

in the living room. Should that room be used for sleeping, no one can sit down to eat without disturbing the occupants. The dining provisions of the offset cross avoid this difficulty and the alcoves may serve as a secondary social center between meals. Figures 92 and 93 are elevator buildings, the former six stories high, the latter thirteen. The differences in living quality of the units produced are too evident to require further comment.





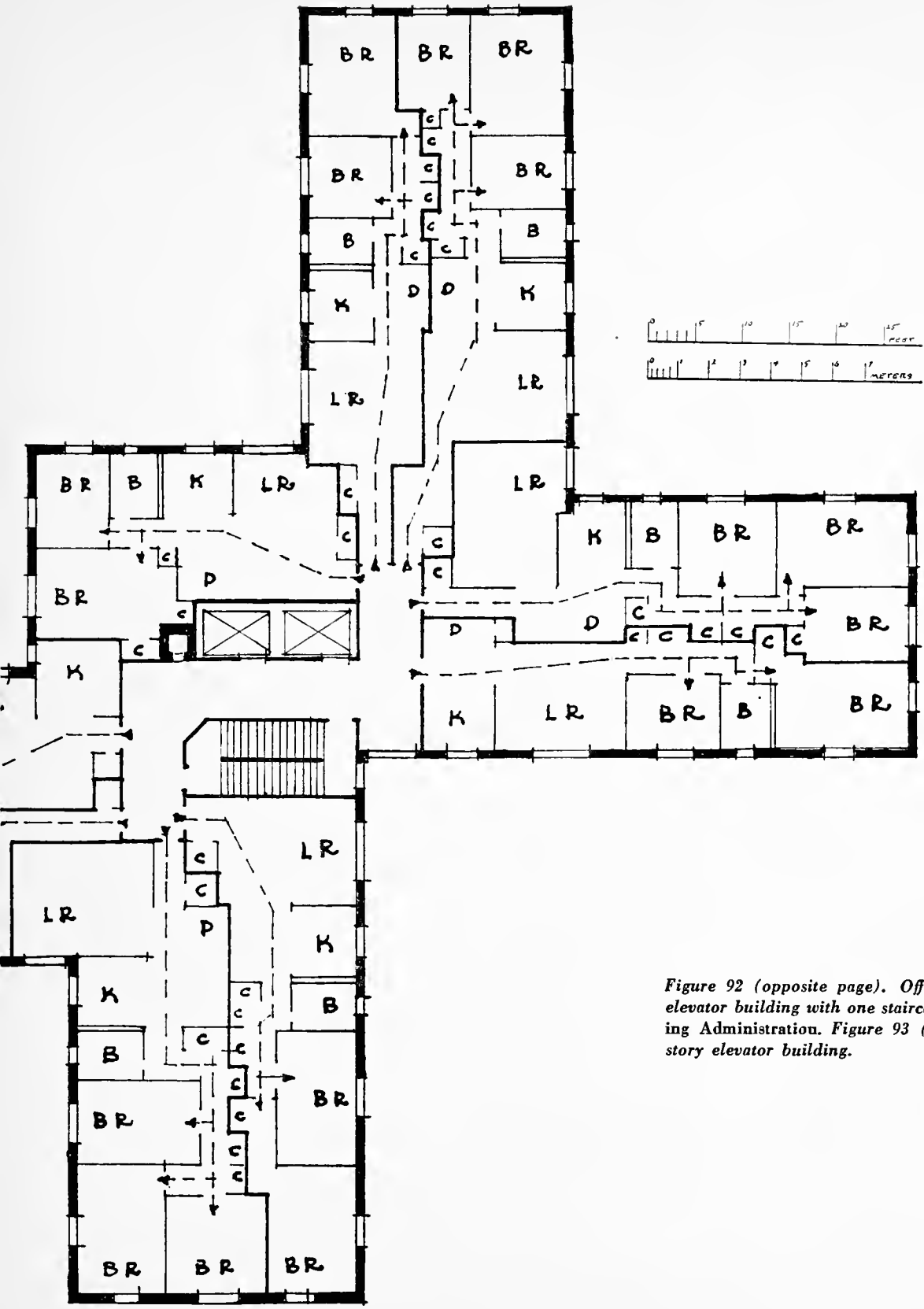


Figure 92 (opposite page). Offset cross six-story elevator building with one staircase. Federal Housing Administration. *Figure 93 (above). Thirteen-story elevator building.*

radial units

For want of a better name, we use this term to designate building units having a central symmetrical service core which gives direct access to all apartments with a minimum of public hall. The three principal variants are the solid square, the cross and the pentagonal star. More than five radial wings are inadvisable since the angle of vision is too small and the unlighted core becomes excessive in relation to the total area of the plan (Figure 94). This type of unit must be freestanding and is used almost solely for high rise buildings.

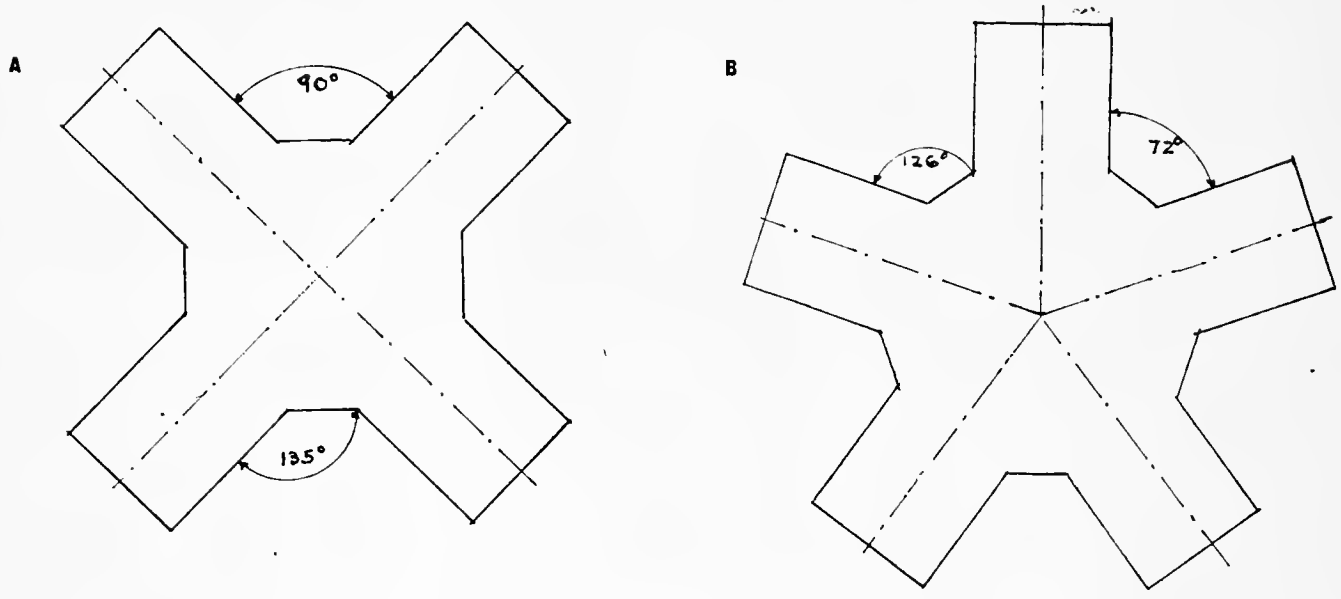
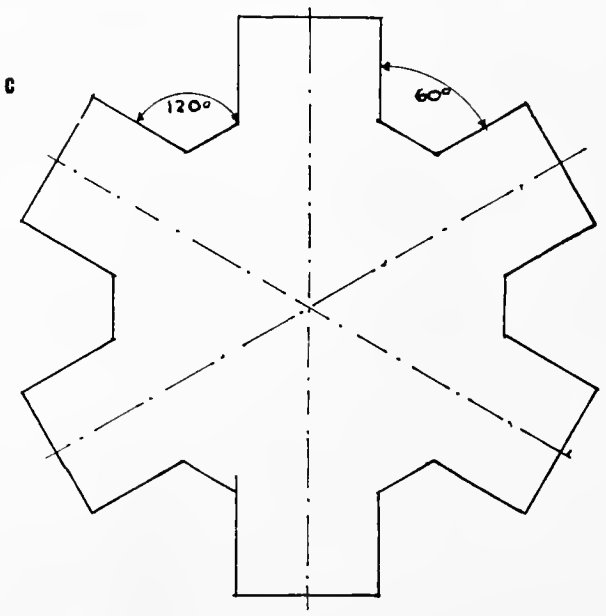


Figure 94. Radial units. A. Square. B. Pentagon. C. Hexagon.



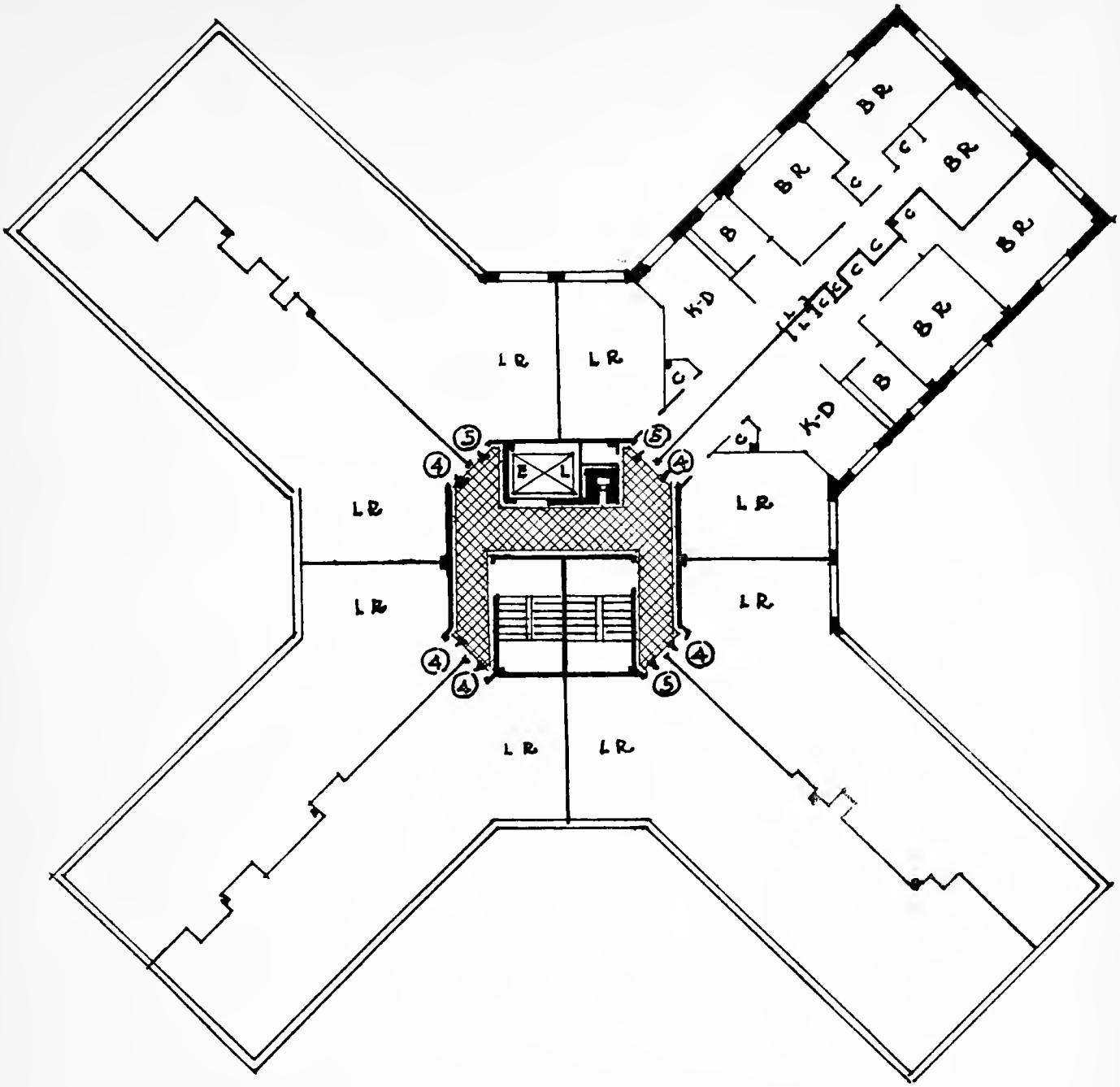
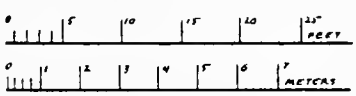


Figure 95. Four-wing radial unit. J. M. Berlinger, architect.



All three examples shown are carefully studied, and livable apartments have been produced. Doubtless realizing the difficulties of obtaining good natural ventilation throughout the units, all the architects have chosen to favor the bedrooms. All other rooms are pocketed; in Figure 96 we may presume that the artificial ventilation, necessary for interior kitchens and baths, also serves the living and dining space.

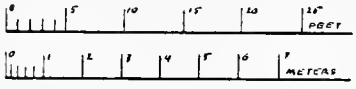
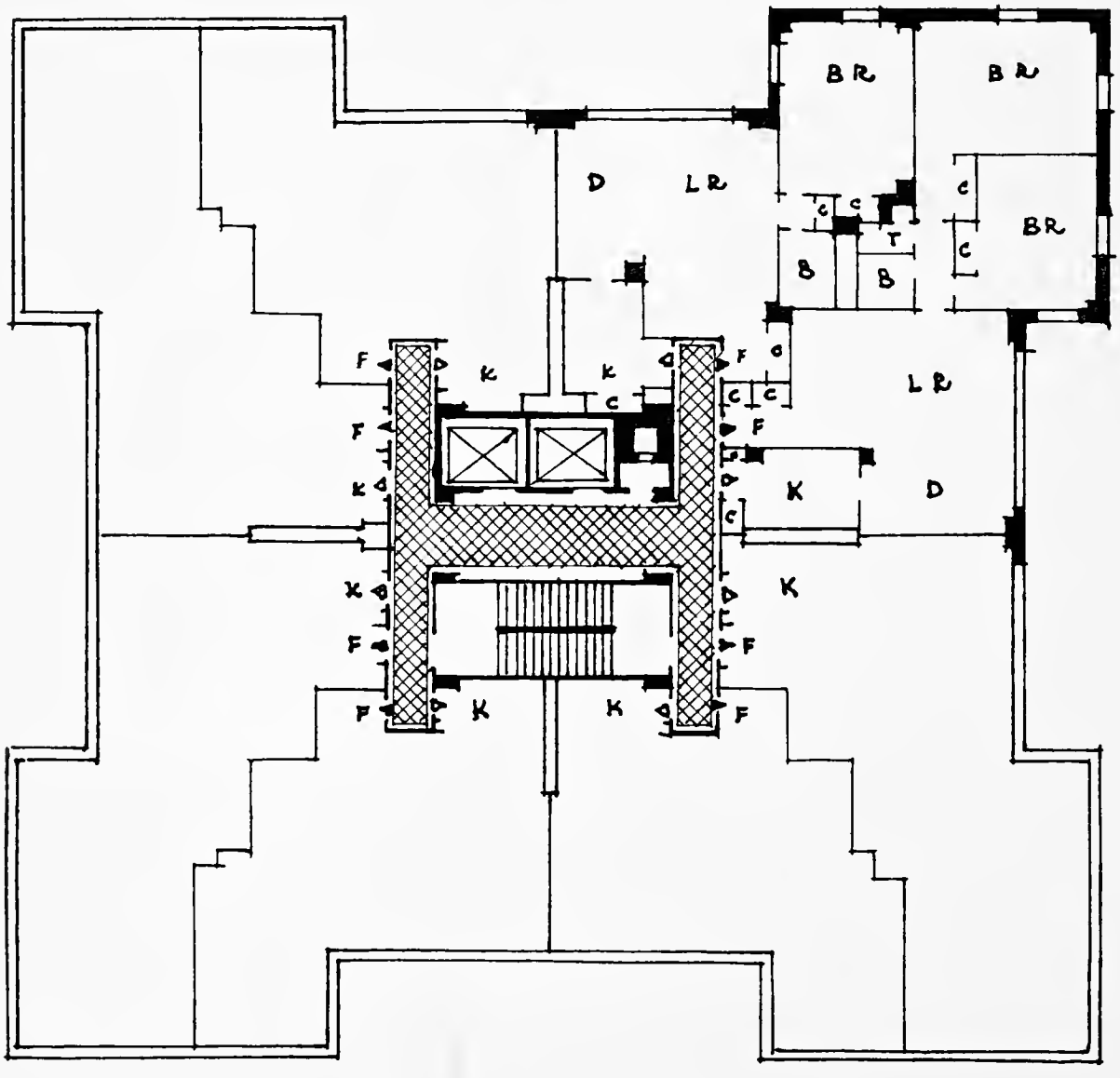


Figure 96. Square unit. Leonard Schultze & Associates, architects.



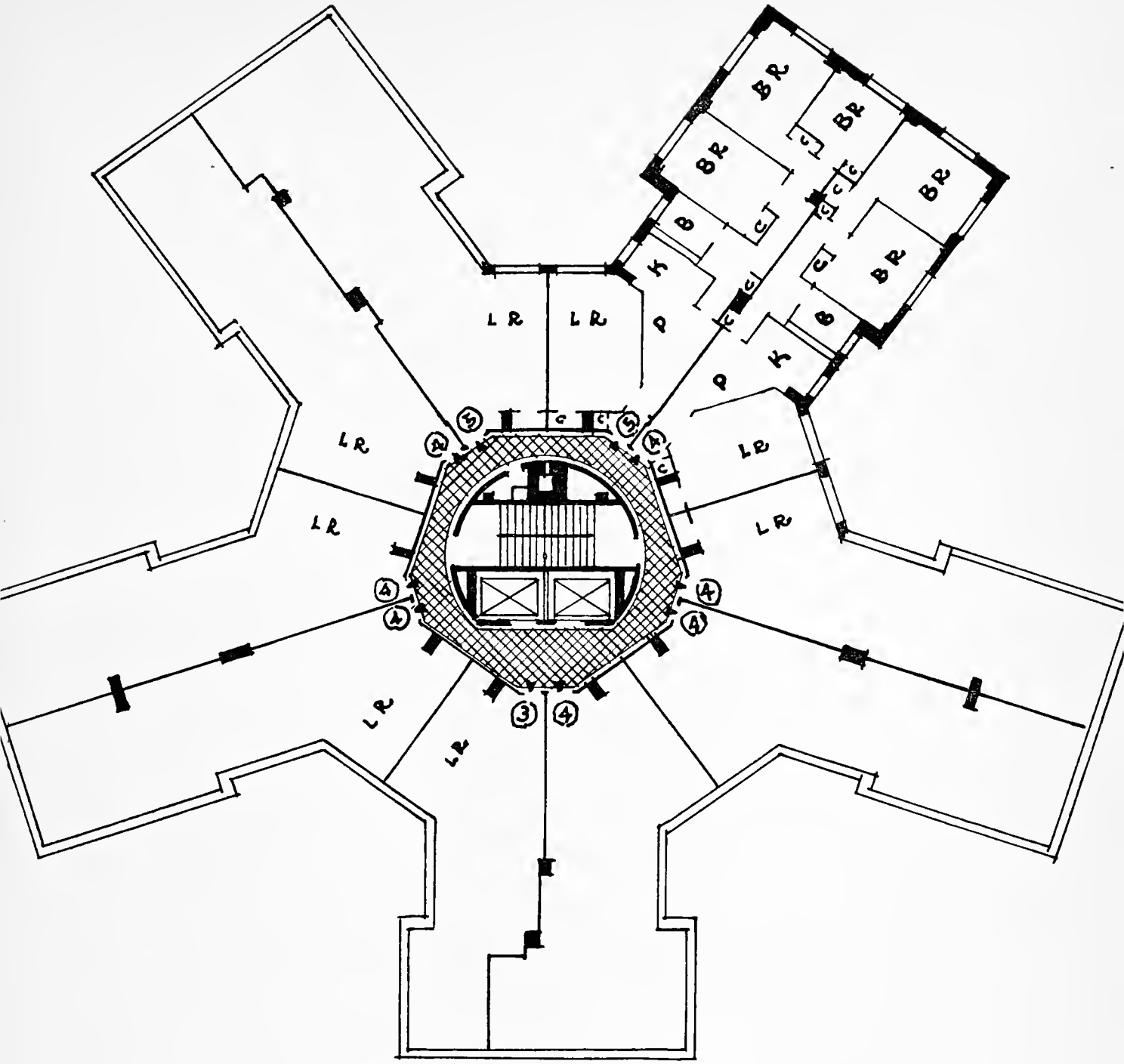
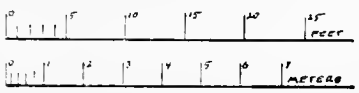


Figure 97. Five-wing unit. Fellheimer, Wagner & Vollmer, architects.



This type of unit has been used for several decades in low-rental housing in Germany, where its open gallery is known as a *laubengang*. It is coming into use in this country. Usually the object of using it is to save in the cost and maintenance of the vertical elements of circulation in apartment buildings, especially where there are many small apartments on each floor. Before adopting it, architects should study carefully whether it really does this in their proposed project; no a priori assumption can be made. If there are enough apartments in a single building unit, it may do so, particularly if elevators and dual exits are required. The savings in annual costs must be substantial to justify its choice, since it has many drawbacks.

Here are some of the elements to be considered in arriving at a conclusion:

1. *Climate* In consistently warm areas its openness and airiness is a decided advantage, and approaching one's apartment through a shaded walk is preferable to an enclosed stair hall which may be hot and reek of corned beef and cabbage. In cold and snowy areas an open passage on the tenth floor swept by subzero winds may be a source of torture.

2. *Maintenance* Open galleries gather more dust than enclosed stairs and halls and must be cleaned more frequently. Tenants cannot be relied upon for snow and ice removal, hence the management must be prepared to do it, unless the floors of the passages are heated sufficiently to melt the snow or ice as it accumulates, an expensive little item. The removal must be done when needed, be it at noon or midnight, to prevent accidents. Anyone who has sat on a jury trying landlord negligence cases knows this. Obviously the galleries must be lighted at night and the lighting so arranged that the tenants of abutting apartments suffer no annoyance.

3. *Policing* An open-air space at your own door is an invitation to sit out in pleasant weather, but since the galleries are required fire exits, this cannot be permitted, and the management must constantly be vigilant that the exits are not blocked. Even though the gallery be wider than required by law, there is no assurance that tenants' chairs will be placed only against the wall.

4. *Privacy* If tenants are not to be disturbed by the conversation of passers-by, no bedrooms or living rooms may face the gallery. Only the kitchen and the bath can be placed on that side, and the windows of these rooms must have sills above the eye level to afford visual privacy. Of course, not even these provisions can prevent willful annoyance, and windows along the gallery must have locking devices to prevent intrusion when they are left partially open for ventilation.

In Figure 98, A and B, a comparison is made of a gallery unit with one staircase and a strip unit with two apartments. The strip unit has ten square feet of additional area, counting the open gallery at half its actual

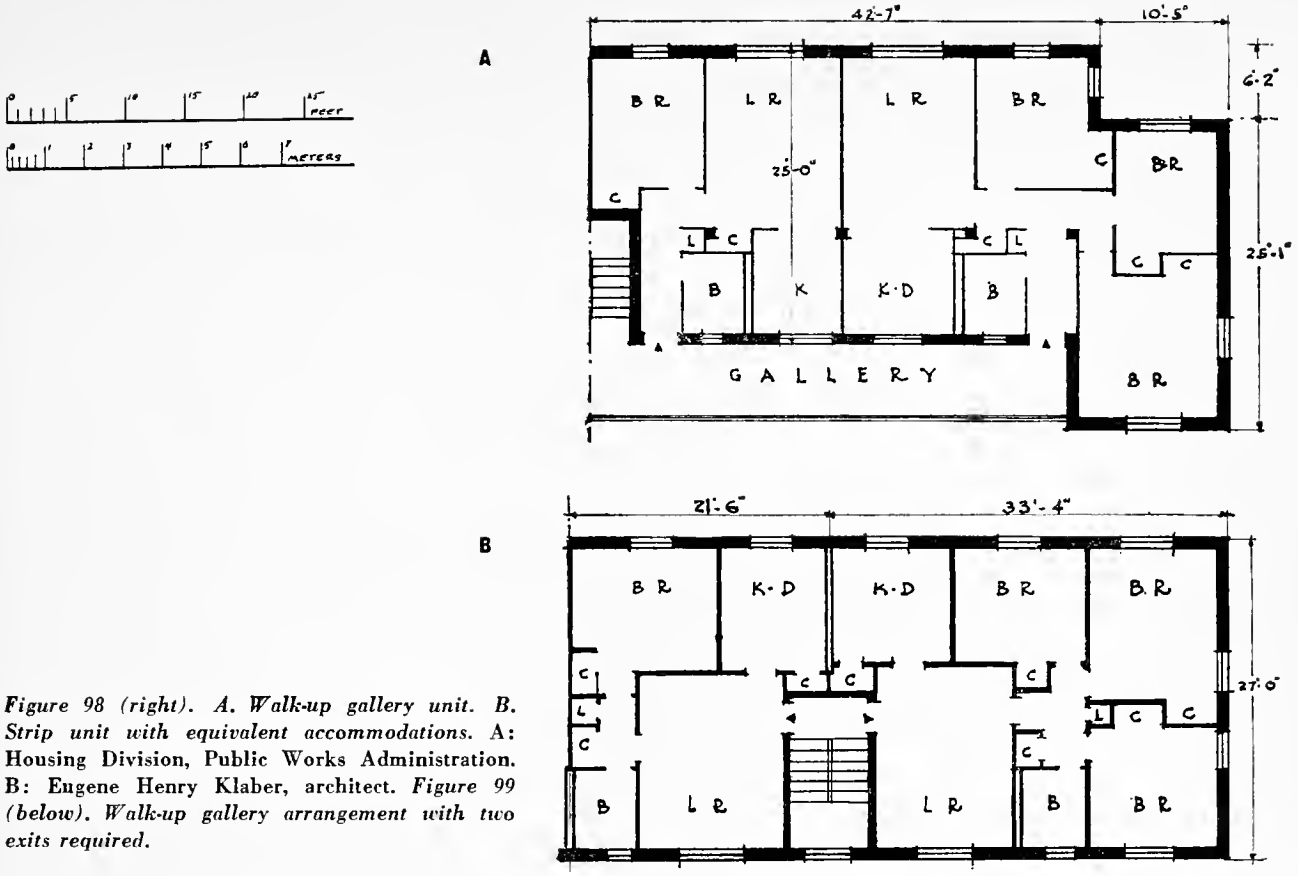
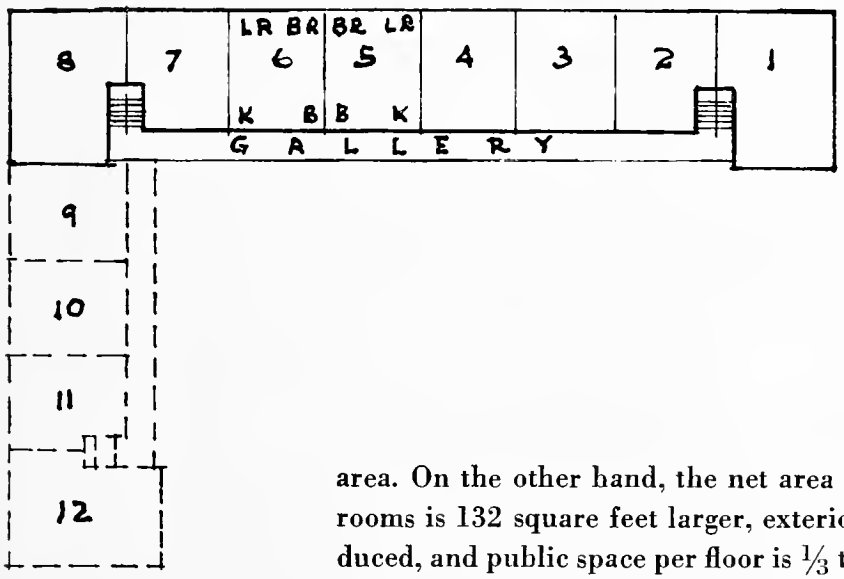


Figure 98 (right). A. Walk-up gallery unit. B. Strip unit with equivalent accommodations. A: Housing Division, Public Works Administration. B: Eugene Henry Klaber, architect. *Figure 99 (below). Walk-up gallery arrangement with two exits required.*



area. On the other hand, the net area of living rooms, kitchens and bedrooms is 132 square feet larger, exterior wall length is less per room produced, and public space per floor is ⅓ that of the gallery type. This simple study indicates the type of analysis that is required in every case. Only one conclusion can be drawn from it; that for four apartments per floor, with a single exit required, two strip units are preferable to a gallery unit. This may not be true with six or more units or with a double exit requirement, as shown in Figure 99.

In elevator buildings analysis is of necessity more complex. How many apartments can be served adequately by an elevator? With additional elevators there is a considerable added first cost. Will a lower operating cost plus saving of wear and tear compensate for this? Are there other savings arising from more economical layouts, which would warrant the added elevator cost? These questions are suggested by Figure 100, the more usual arrangement with only kitchen and bath facing the gallery. In 101 the position of the elevators at the center of the plan permits an apartment layout with little waste space. With buildings of similar height, each elevator in 100 serves 63 families; in 101 the maximum number is 42, but most serve only 28. Doubtless the architect of 101 has satisfied himself as to the economics of the elevator scheme. It will be noted that with the position of the elevator lobby normal access and exit traffic will not require use of the gallery, hence the dining and living space face it. Of course no one must use the gallery except in case of emergency, but the occupants can never feel sure of their privacy. What happens when the kids in apartment 1 decide to use their roller skates, and when mother in apartment 4 on the eleventh floor decides to visit her daughter in apartment 10 on the twelfth?

Both of these examples have elevator stops on all floors. Many schemes have been developed for omitting stops on some of the floors. Three types are shown. In 102 the elevators stop every second floor, in 103 every third floor, and in 104 at intermediate levels, four floors apart.

Figure 102 is the "maisonette" scheme. In effect it consists of a series of row houses, stacked one on top of another; the stairs, elevators, and galleries serve merely to carry one to the successive "ground" floors. This scheme works admirably, especially where there is a preferential exposure, since only one room faces the gallery side of the building. Figure 103 comprises only apartments. The gallery is on the middle of three

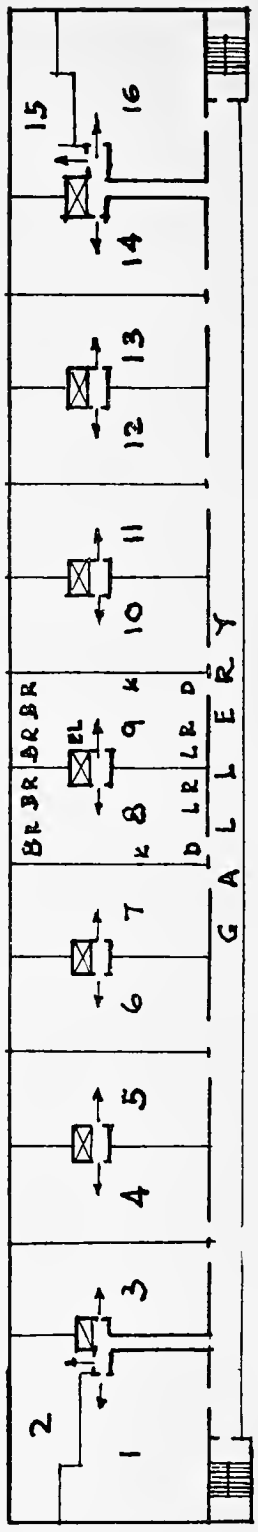
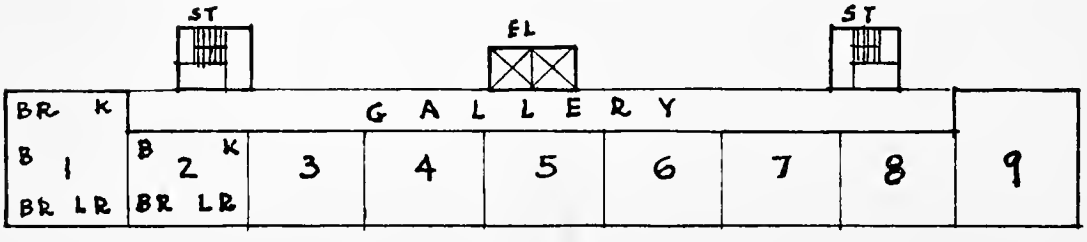


Figure 100 (below). Multi-story elevator building with elevator stops at all floors. If there are fifteen stories, each elevator serves 63 apartments. Figure 101 (right). Multi-elevator building with elevator stops at all floors. If there are fifteen stories, the end elevators serve 42 apartments each, and the others serve 28 apartments each. Oscar Stonorov, architect.



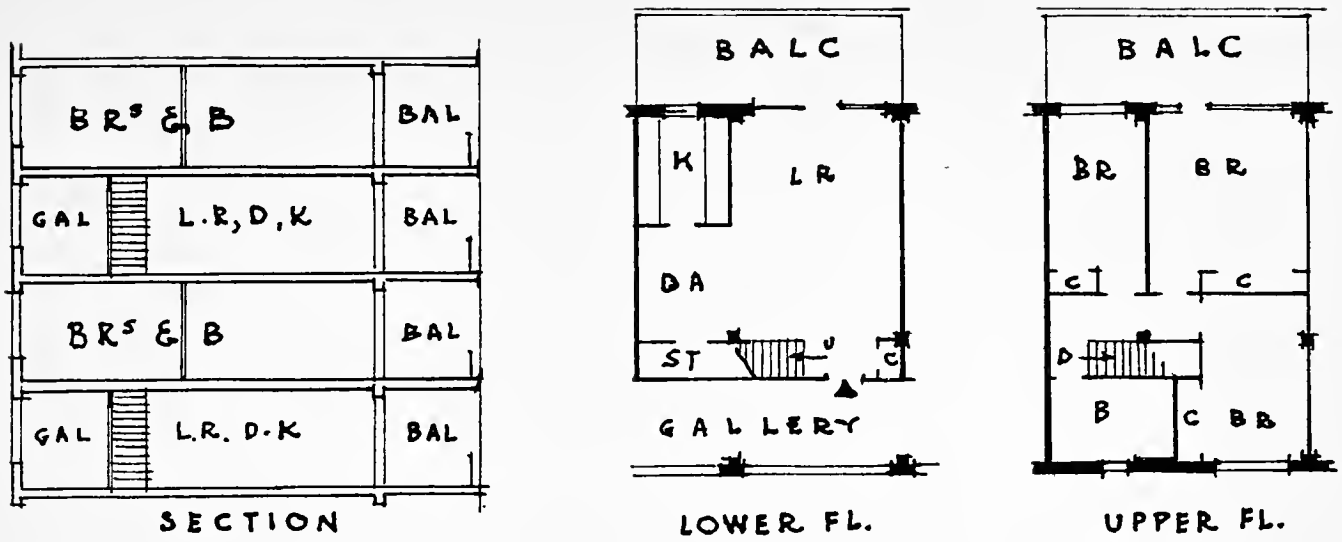
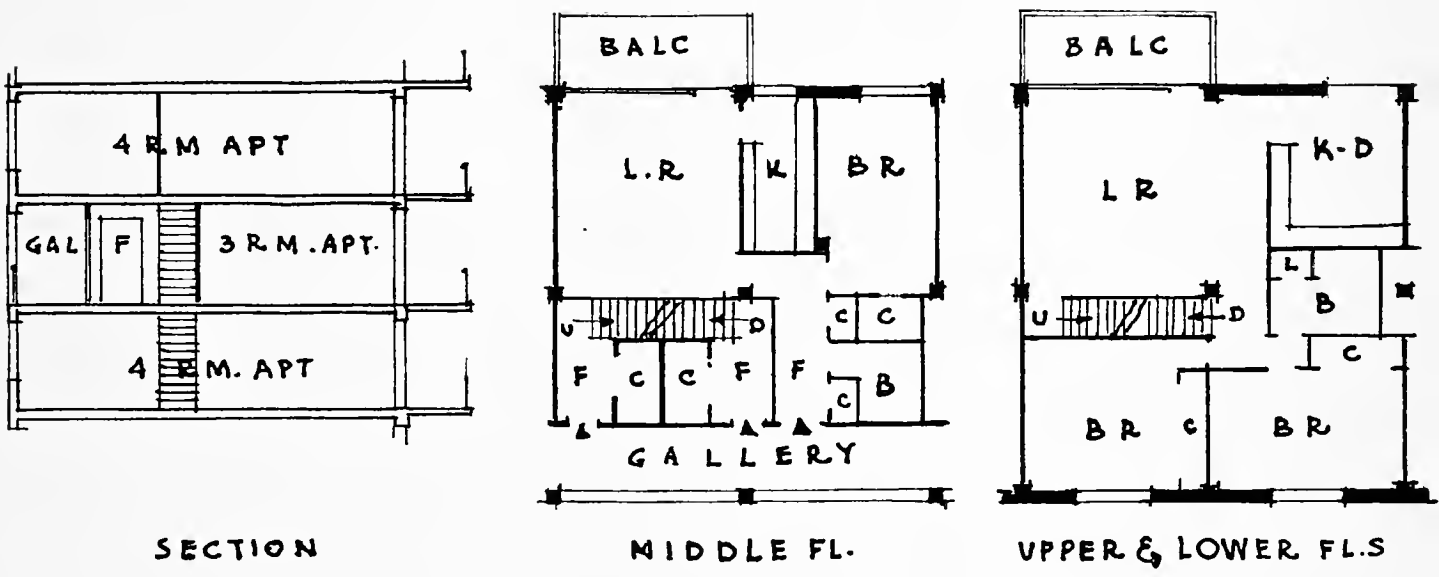


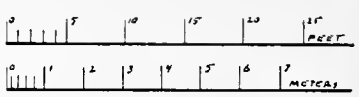
Figure 102 (above). Skip-stop elevators serve maisonettes with a gallery on every second floor. Berla & Abel, architects. *Figure 103 (below). Skip-stop elevators serve apartments with a gallery on every third floor.* Koch, Kennedy, De Mars, and Rapson, architects.

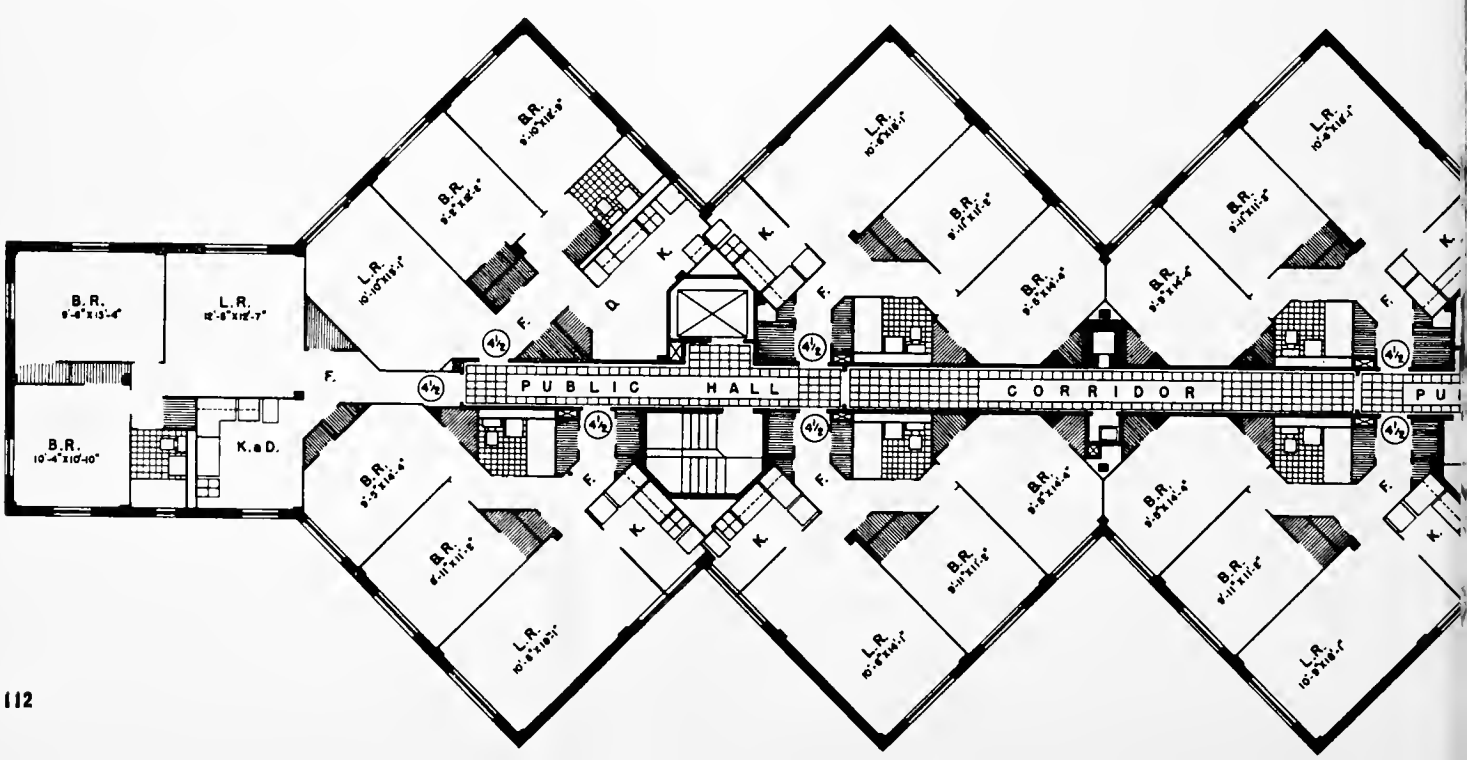


stories. The middle floor has a one-bedroom unit, the upper and lower floors have each an additional bedroom. Considerable space is devoted to stairs and foyer on the middle floor and some on both upper and lower, but the aggregate area is evidently less than three full galleries would require. In using a scheme of this kind, architects should analyze total elevator travel to determine what savings there may be in a skip-stop scheme. In 104 the building is planned as three superposed layers of three-story

walk-up apartment buildings. The elevators stop at only two levels above the entrance. The stops are midway between floors. Although all tenants must walk either up or down, none must mount or descend more than one and one-half stories. As shown, this scheme requires seven complete staircases for thirty-eight rooms per floor, somewhat more than in a strip unit with two three-room units per floor. The poor position of the bedroom windows above and below the gallery levels affects the livability of apartments on five of the nine living floors. It will be noted that the midstory location of the access galleries permits their enclosure. This avoids the climatic difficulties of the open gallery.

In this chapter we have discussed only the more common forms of building unit. This does not shut the door against atypical designs, which may have all the desirable characteristics of layout which have been mentioned. We close with one such plan, Figure 105. Here is a corridor type plan in which corner or through ventilation has been achieved for all of ten apartments per floor. The entire layout is replete with strokes of architectural ingenuity. As compared with a rectangular layout, the many angular intersections have perhaps added to the cost of framing and finish; on the other hand, the length of perimeter wall is economical. There are forty-one rooms per floor and an average of about 13 feet of outside wall per room. Compare this with Figure 93, which has 39 rooms per floor, fourteen feet of wall per room and only one of nine apartments with satisfactory natural ventilation. It is reported that the actual cost was consistent with that of other types of multi-story apartments in New York, but even if the cost had been greater, it might well have been warranted by the greatly added amenity of the units produced.





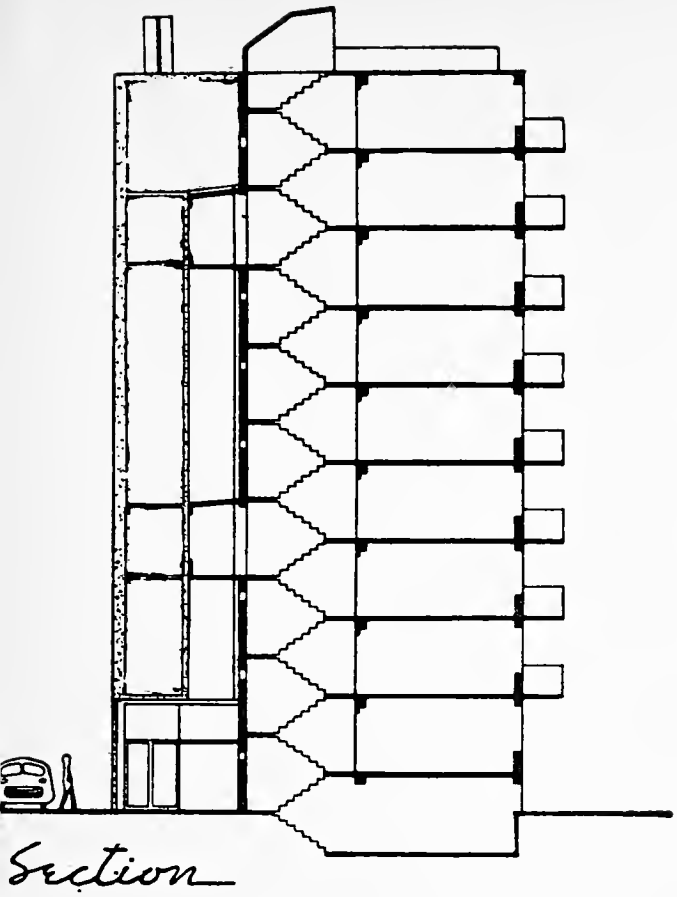
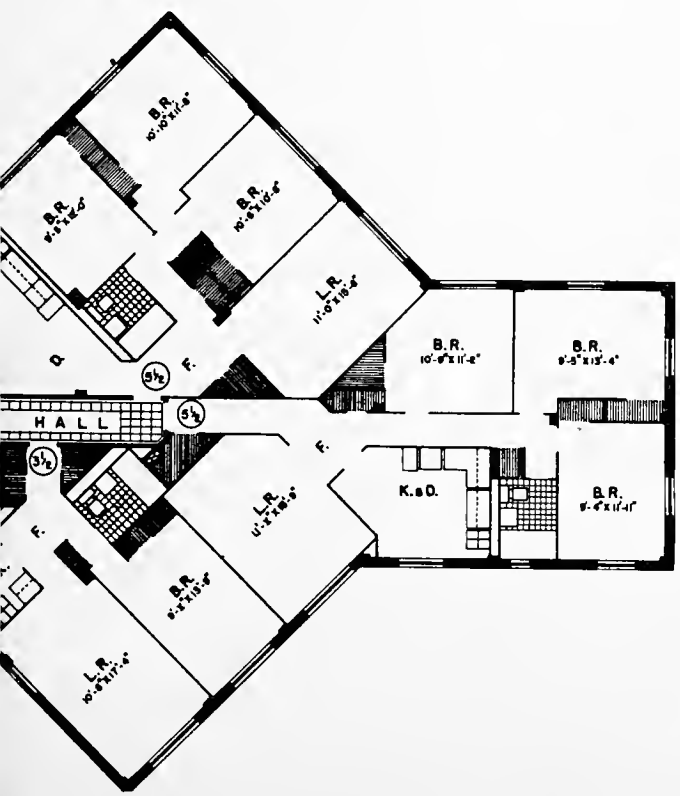
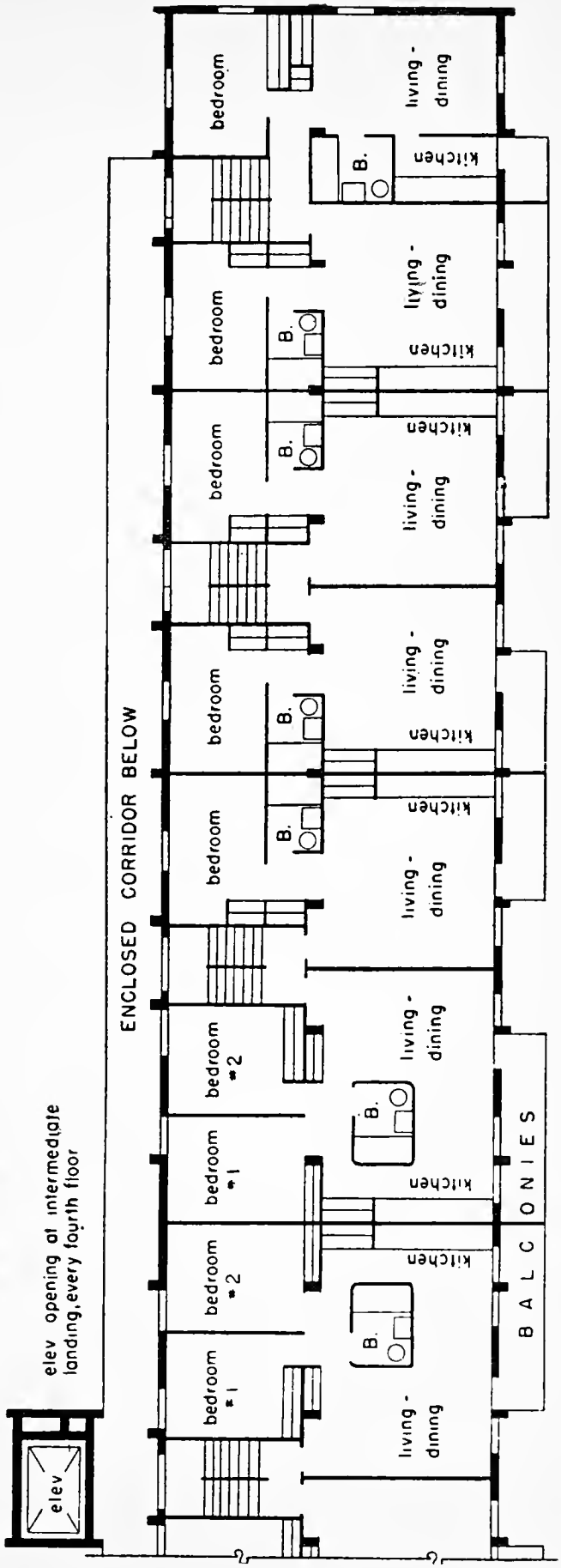


Figure 104 (above and right). Skip-stop elevators stop on every fourth floor. Lowenberg & Lowenberg, Weese and Van der Meulen, architects. *Figure 105 (below). Central corridor plan. All units have natural ventilation.* Emery Roth & Sons, architects.





Elements of Common Service

Up to the present point, our discussion has concerned the buildings in a project; hereafter, we shall consider exterior elements and relationships, principally site planning. This seems to be the appropriate point at which to say something of service elements used in common by the occupants of housing, since they are related both to the dwellings and to their environment. Obviously this means rental housing; houses built to sell are supposedly designed to care for all necessary types of service within four lot lines. No attempt is made to give authoritative answers to problems of service; this is merely a reminder of the manifold considerations that architects must study as part of the planning process.

The topics discussed are: elements of circulation within the buildings, perambulators and bicycles, heating and other utilities, laundries, waste removal, requirements of management, and provisions for deliveries.

circulation within the buildings

There are four principal media of circulation, public halls, staircases, elevators, and dumbwaiters; a few words on each.

1. *Public halls* are more costly to build than equivalent space within the dwelling units because of the requirement of added durability and need for fire protection; since they must be cleaned frequently by the management, every effort should be made to keep their area within reasonable limits. Should a reduction of public hall space require excessive corridor length within the apartments, an added annual cost of repairs and decoration will be necessary. Therefore, in some cases it may be better to have a

larger public hall and less interior corridor length. It would be of interest to make a comparative study of the plans shown in Figures 93 and 105 on the basis of capital cost translated into annual charges plus cost of maintenance and repairs.

2. *Staircases* Flights of steps should be straight, especially where furniture must be carried up and down. Winders are dangerous and create an added liability for the management. A staircase with "balanced" treads may be acceptable. The design of such staircases is an art, perfected by the French in the eighteenth century, but seldom practiced in this country, perhaps because of the high cost of the necessary craftsmanship. Those cute little spiral staircases which sprout so frequently in "maisonette" plans are poison. Imagine trying to carry a chest of drawers up the stairs to the bedroom.

3. *Elevators* are subject to breakdown, and cable-types must have the cables renewed periodically. This means stoppage of service, sometimes for many hours, unless each building unit has at least two elevators. Some building units of seven or eight stories have been built with a single elevator; six-story buildings seldom have more than one. If the elevator is not working, walking downstairs is not too much of a hardship, but the climb upstairs is a different matter. One acceptable expedient is to build at least two units as parts of one building. If the elevator service is stopped in one unit, the tenants of the upper floors can go to the top floor of the adjacent unit, cross the roof between penthouses, and walk down. The problem of the stalled elevator has been cleverly handled in the plan shown on Figure 101.

4. *Dumbwaiters* as a means of delivery and waste removal have been used in apartments five or more stories in height, principally in New York. They are a logical answer to certain needs, some of which no longer exist. When there were no electric refrigerators, ice was delivered by dumbwaiter, and the drippings went down the shaft instead of slopping up the stair halls. There are several advantages in the use of dumbwaiters. Deliveries of milk, laundry, and packages are made without going upstairs, and when waste is removed, the collection containers remain in the basement. The shortcomings far outweigh the advantages. A dumbwaiter shaft is a fire hazard even if enclosed in incombustible materials. Almost inevitably the shafts become dirty and harbor vermin; the bottom is frequently littered and is likely to be the spot for committing public nuisance, unless basement toilets are provided. In the past, dumbwaiters have been a favorite means of transportation for burglars; and pilfering the neighbors' milk was fair game. Cash and carry buying and curtailment of delivery services have obviated the need for dumbwaiters, and their use is on the wane. Perhaps it is well. In multi-story buildings some of its functions are

served by the elevators, and sometimes package receiving rooms are used as a convenience to tenants who may be out when deliveries are made.

storage of perambulators and bicycles

The storage of perambulators and bicycles presents a real problem in apartment houses. In flats and row houses it is a comparatively simple matter to provide a utility closet for each tenant for this purpose. Such a closet should preferably be accessible from outdoors, since wheeled vehicles drag dirt into the house. In walk-up apartments it may be possible to have a closet for the purpose in the entrance hall; if not, space may be allocated in the basement reached from outside by an area ramp. In elevator apartments a room is frequently provided in the basement or preferably on the entrance floor. But no scheme of common storage space is thoroughly satisfactory, especially for baby buggies. Blankets and pillows cannot be left in them while in storage because of the dangers of dirt and pilferage. This means not only that mothers must carry their infants up and down, but also all protection for the baby, usually one feeding of its formula, in addition to her purse and other belongings. Women do not like to take infants to the basement; indeed, many fear to go there themselves. Hence if room cannot be made in the apartment, the best scheme appears to comprise a small room downstairs for bicycles with racks to which they may be locked and a perambulator room on each of the living floors. Remember that a pram takes up a lot of room in an elevator and that the cab should be sufficiently large to permit others to enter it when mother is about to take her offspring for an airing. A thirteenth floor tenant in a New York housing project informed the writer that she and her child always traveled up and down alone because the elevator cab was too small. It isn't good sense!

heating and utilities

1. *Heating* The selection and design of a heating system for a housing project of more than a few units requires the services of a mechanical engineer. It involves a study of first cost, operating costs, available fuels, and required personnel. Heating by the tenant is not usually feasible in apartment buildings except in very mild climates, where small gas or electric units may serve the purpose. In colder climates some form of central heating is usual practice. This may mean a boiler room in each unit, several plants, each serving a group of units, or a central plant for the entire project, possibly with zone controls and underground pipe tunnels to the buildings. It is impossible to discuss here the pros and cons of these methods, but there is one principal fact that architects should bear in mind—a heating system has three elements: heat generation, heat transmission, and heat distribution in the rooms to be served. It may be said that the third element produces the income and the others consume it; hence an economical system is one in which the generation and the horizontal elements represent

as small a proportion of the cost of installation as possible. The cost of the distributive elements (radiators, etc.) is a comparatively fixed quantity for a given project once the type of equipment has been chosen and the range of temperature been determined.

Mention has been made of mechanical ventilation and the fact that it is good only if it can be operated and *is* operated. Except in buildings over ten stories in height, the cost of operation precludes its use in low-rent housing. This is all the more true of air-cooling systems, which are quite expensive to install and operate.

2. *Utilities* Water, gas and electricity are the three ordinarily used. Water is usually furnished by the management and its cost included in the rental. The landlord pays the water bill. Americans are notoriously wasteful of water, especially if they do not pay the bills directly. Management cannot possibly control the tenants' use and waste of water for ordinary purposes, but in times of drought, when the central reservoirs are running low, it may be necessary to restrict their use of water for gardening, wading pools, and car washing. One of the principal sources of waste is leakage from defective piping and faucets. Here the architect can play his part by specifying only non-corrosive water lines and first class bath and kitchen faucets. First cost is not the prime factor; cheap materials and equipment cost more in the end.

Hot water supply is always a headache for management. Tenants seldom shut it off when washing laundry, dishes, or themselves. Little can be done about this in housing whose rental is in a competitive market. In other cases, where utilities are metered directly to the tenants, it is possible to have a small hot water heater (what the British call a "geyser") in each dwelling unit. This would save in the cost of supply lines, but would require periodic inspection and repair of the heating apparatus.

Gas and electricity may be metered directly or supplied by the management, which pays through a master meter and charges the tenants a monthly fee. The servicing and reading of hundreds of meters is an expense to the utility corporation, which also suffers the loss of leakage within the building and outside the meters. Hence they give lower rates where a master meter is installed. This means less charge to the management and perhaps also to the tenant. This method does not deter waste. As an example: where there is a flat charge for electricity, many tenants use portable air-cooling devices in summer.

The only way to prompt economy in the use of utilities by the tenant is to make it worth his while in dollars and cents. This might be done by charging an amount for the services and rebating a share of savings.

laundries The nature and extent of the provisions for laundry work outside the

dwelling unit can be determined only when the prospective tenancy and their living habits are known. Will wash be sent out to a private laundry? Will tenants patronize the "launderette"? What proportion will do all their washing and ironing at home? If common laundry facilities are provided, should they comprise only washing and drying, or should equipment for ironing also be included? Is there space for outdoor drying; if so, how can it be made accessible and convenient for tenants?

Two facts are obvious. The lower the income level of the tenants, the greater the likelihood that all laundry work will be done at home. Where elevator buildings are used, it is virtually impossible to have drying yards on the premises. Too much space would be required; too much confusion and wrangling would result.

If it is decided that there shall be common laundries, where should they be? Even when the prospective tenancy is known, there is so much uncertainty as to the demand that it is advisable to concentrate facilities at one point in the building. This is usually on the roof, on the first floor, or in the basement. The roof is a good spot for washing and air drying; if it is used, the entire area must be enclosed by a high wire fence. Many mothers take their children along when they do the wash, and youngsters like to climb. A laundry on the first floor has great advantages. Through ventilation is readily provided, and the fear of the mysterious and sinister downstairs is obviated. In walk-up apartments, the first floor is seldom available, and a basement laundry is acceptable provided at least half of the basement is above grade.

Figure 106 shows a basement laundry and one on the entrance floor. The former plan is a complete laundry. It was prepared to illustrate important considerations and relationships. In practice some of the features shown will usually be omitted; it is unlikely that a single laundry would have three methods of drying: gas driers, indoor and outdoor air drying. It assumes thirty to forty families in the building, most of whom do their own washing. Here are some items to be noted:

1. Through ventilation is of prime importance for the indoor drying space.
2. Wet operations should be separated from drying and ironing.
3. A toilet is essential.
4. Tenants who own washing machines should have some space to store them; they cannot be toted upstairs.
5. Lockers are advisable for storage of tenants' soaps and irons.
6. Wire cages for drying which can be padlocked are preferable to an undivided space. The clothes lines should be parallel to the line of through draft.

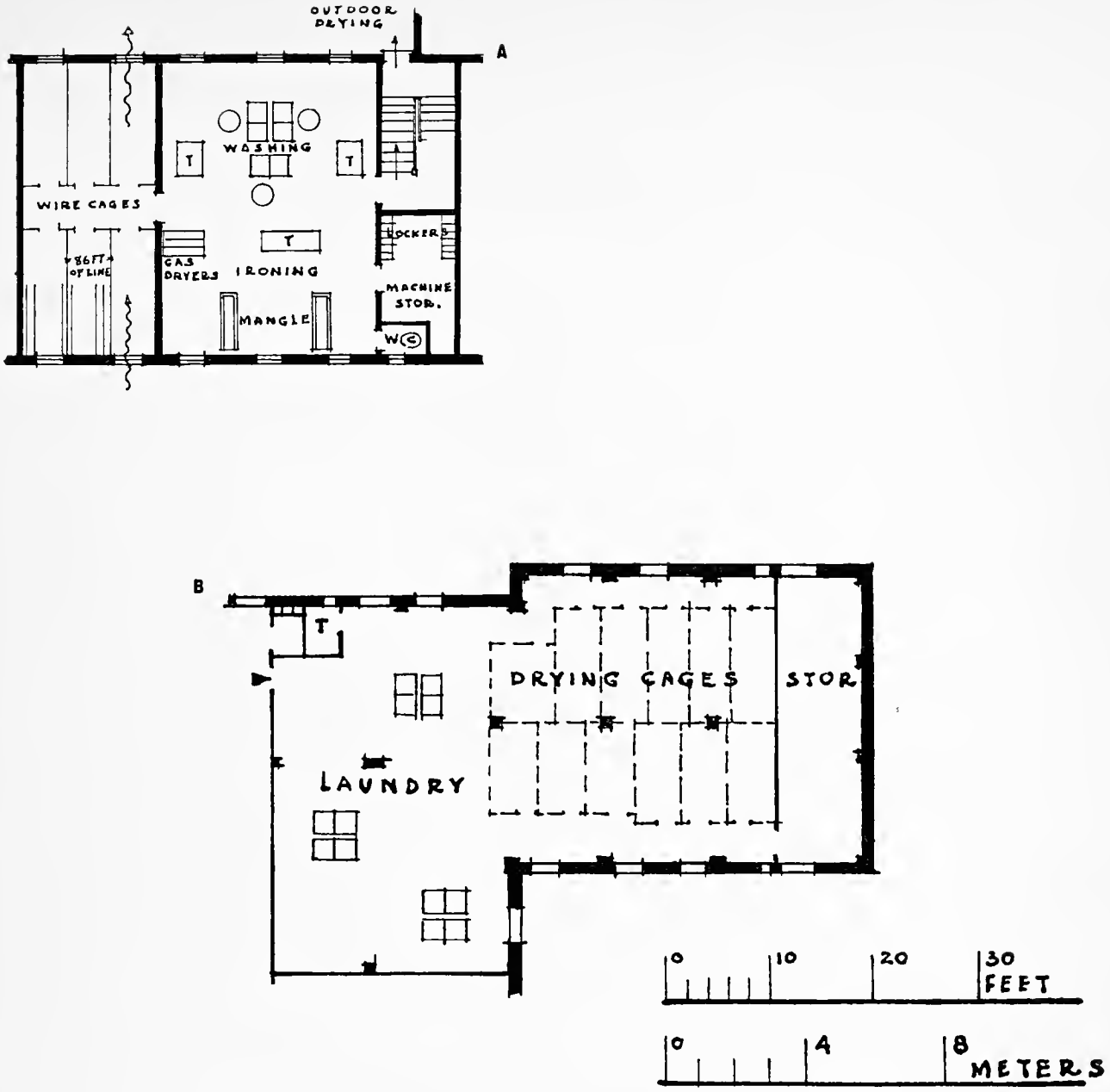
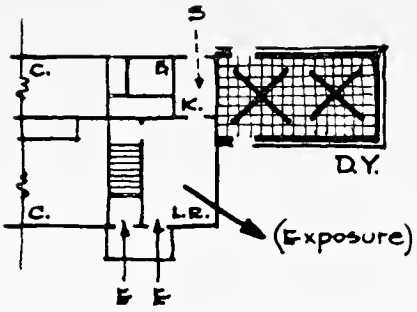


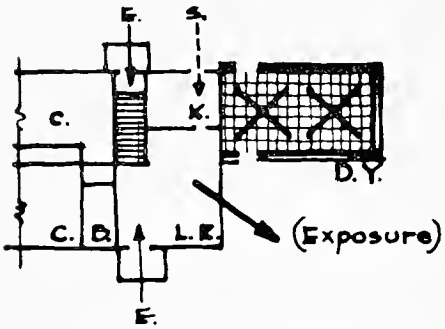
Figure 106. A. Complete basement laundry for 30 to 40 families. B. First floor laundry, but no ironing facilities, for 130 families. Federick L. Ackerman and Lafayette Goldstone, architects.



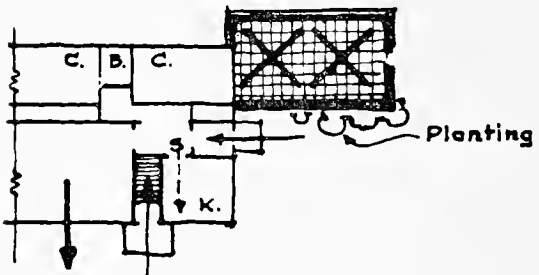
SINGLE ENTRANCES ON ONE SIDE.

Laundry screened.

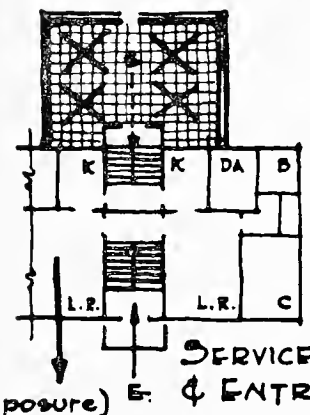
No Screening.



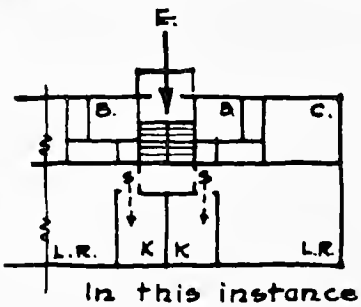
ENTRANCES ON TWO SIDES.



ENTRANCES ON FRONT & END.



SERVICE STAIRS & ENTRY HALL OPPOSITE SIDES.



ALL ACCESS ON ONE SIDE.

In this instance a common drying yard at a convenient distance from the building would be required.

Figure 107. Outdoor drying for flats and walk-ups. Rental Housing Division, Federal Housing Administration.

Outdoor drying is no problem in row-house developments; the obvious spot for drying is the back yard, and tenants prefer this. For flats and walk-up apartments, common yards are advisable if drying is not done in the building. These should be screened by masonry walls, lattice fences, or by shrubbery surrounding a wire enclosure. Suggestions of location are shown in Figure 107.

waste removal

The disposal of garbage and trash may be a single process of removal at the door of each dwelling unit by a truck which takes it to the point of ultimate disposal. City door-to-door collection is of this kind. More frequently a double process is involved, the first stage being collection and the second removal. Collection by management in an apartment building and subsequent city removal of the accumulated waste is of this type. Within this framework there are many variants which depend on local conditions—the frequency of service, who makes the collection, the instruments of collection, the possible need of temporary storage while awaiting removal, who does the removal, and final disposal on or off the premises.

Frequency of Service In almost all cases in which garbage and trash are incinerated on the premises, collection is made daily. When removal is less frequent, two cases occur. Either the management makes daily collection, necessitating intermediate storage facilities, or else the tenant stores waste matter for several days at a time between collections. The latter alternative is hardly possible in apartment buildings because of space requirements, added fire hazard, and odor nuisance. It is a feasible scheme for group houses, single-family homes, and flats. If adopted, it requires added special storage facilities, usually outside the dwelling.

In some communities having municipal disposal, the town takes away trash and garbage indiscriminately with no requirement of separation. In some cases, the two are required to be kept in separate containers, and in some towns only garbage is received and trash must be burnt or otherwise disposed of by the project management. The requirements in each case are different and the necessity of knowing in advance what system is used is obvious.

Intermediate storage This is necessary only when waste is not incinerated on the premises and city collection is not a daily occurrence. Some place must be provided to keep collected refuse, pending its removal from the premises. This is most frequently provided in the form of one or more garbage and trash stations on the grounds. Such stations present serious problems of sightliness and sanitation. They should be isolated as far as possible and screened from view by planting, preferably of dense evergreens. Garbage stations should be rat proof. In some climates, it is necessary that they be closed refrigerated compartments. Where this is not neces-

sary, they should be well ventilated buildings with fly screens. Wherever possible, they should be located to the leeward of the dwelling units with respect to the prevailing summer winds. They must be served by driveways to permit ready removal.

Methods of Collection There are a number of methods of collection, that is, bringing refuse together at the point of removal. They vary with local custom and with the amount of service demanded of the management at a given rental level. They vary between the extremes of requiring the tenant to carry his own garbage to the collection point and washing his own container, and the service rendered in apartment hotels in which collection is sometimes made twice a day at the apartment servidor in paper-lined cans furnished and cleaned by the management. The following are some of the schemes which are frequently used:

Elevator Apartments

1. Incinerator stacks accessible from each kitchen.

2. Incinerator hopper in service stairhall, to which tenant or management carries refuse.

3. Servidor accessible from hall and kitchen, removal by management. This requires either an incinerator or access to a service stair down which the management takes refuse to the basement.

4. Door to door collection.

5. Dumbwaiters to each kitchen, collector stationed at bottom, tenant places refuse on dumbwaiter. As deliveries are also made by dumbwaiter, a special garbage compartment on the dumbwaiter is sometimes provided.

6. Special garbage consuming kitchen sinks. These are expensive to install and do not take care of large articles of trash.

Walk-up Apartments

7. Where service stairs are provided, waste is usually collected by management at the kitchen door. In some low-rent projects, the tenants are required to carry trash and garbage down the service stairs to containers at the bottom or to a garbage station in the yard.

8. In single-stair buildings, the most frequent method is door-to-door collection by the management at stated times. Unless carefully supervised, this is likely to cause an unsightly nuisance on the stair landings and require additional cleaning of halls. When apartment kitchens are adjacent to the stair halls, it is frequently possible to provide cabinets accessible from within and without the apartment.

Flats, Group Houses, and Single-Family Houses

9. In these three types of building, service by management stops at the outside door. The entrance door to the building is consequently the point at which collection begins. In many instances, the collector rings the

bell at the service door, and the garbage and trash are handed to him.

10. A second method is to provide containers into which the tenant places refuse to be removed subsequently by the collector. Frequently these are countersunk in the ground. In row and single family houses, through-wall compartments may also be used. In either case, careful plant screening is necessary to prevent an unsightly appearance and the nuisance of the spread of spilt garbage and blowing papers. This is of special importance in flat buildings where there is but one entrance to the second floor unit and everything comes perforce through the front door.

Methods of Removal There are three principal methods of removal—by municipal service truck, by private contract, and by the project management. In the first and second methods the planning problem is principally one of proper access. Removal by management usually means one or more incineration plants on the premises. In addition, trucks and containers with the necessary storage space and cleaning facilities are required. When trash and garbage are separate, the management frequently derives an income from baled paper. This requires proper machinery. In some large projects, milk bottles are so numerous that they would constitute a nuisance unless collected daily by the management and hauled to a common point. All these ramifications of service have their corresponding space requirements which must be provided. In projects where the use of garbage hand trucks is necessary, the sidewalks should be so arranged as to avoid excessive hauling by hand from the buildings. On sloping terrain, the easy circulation of trucks should be studied. Heavy wheeled trucks cannot climb steps. Steep slopes on the paths greatly increase the labor of pushing the trucks.

Storage within the Dwelling Unit With daily collection, this presents no serious problem. However, when garbage must be kept for several days, some special provision should be made for it. One method of doing this is the insertion in the outside wall of the kitchen of a ventilated container cabinet. For first-floor kitchens, collection may be made from the outside in the same manner as from the servidor cabinet on the inside.

Instruments of Collection It will be evident that in large projects waste removal may require the acquisition of considerable movable equipment—cans, bins, trucks, balers, etc. As these are chattels and not part of the security of the mortgage, they must be acquired with the working capital of the owning corporation. However, the architect must realize that they are needed and make provision for storing and cleaning them. Rinsing of garbage cans is frequently done over a concrete floor basin with a cast iron cover, vertical water jet, and special drainage fitting. Figure 108 illustrates diagrammatically some of the provisions for waste disposal mentioned above.

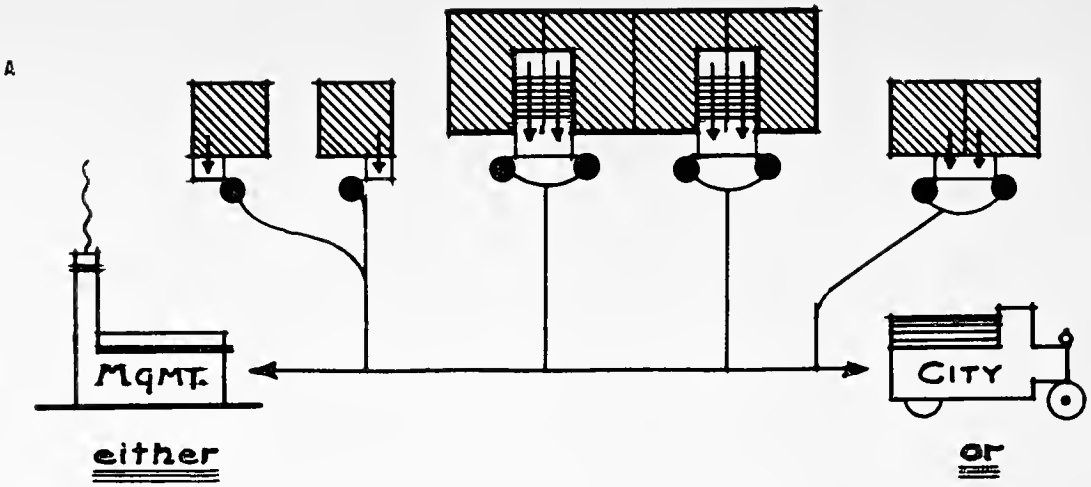
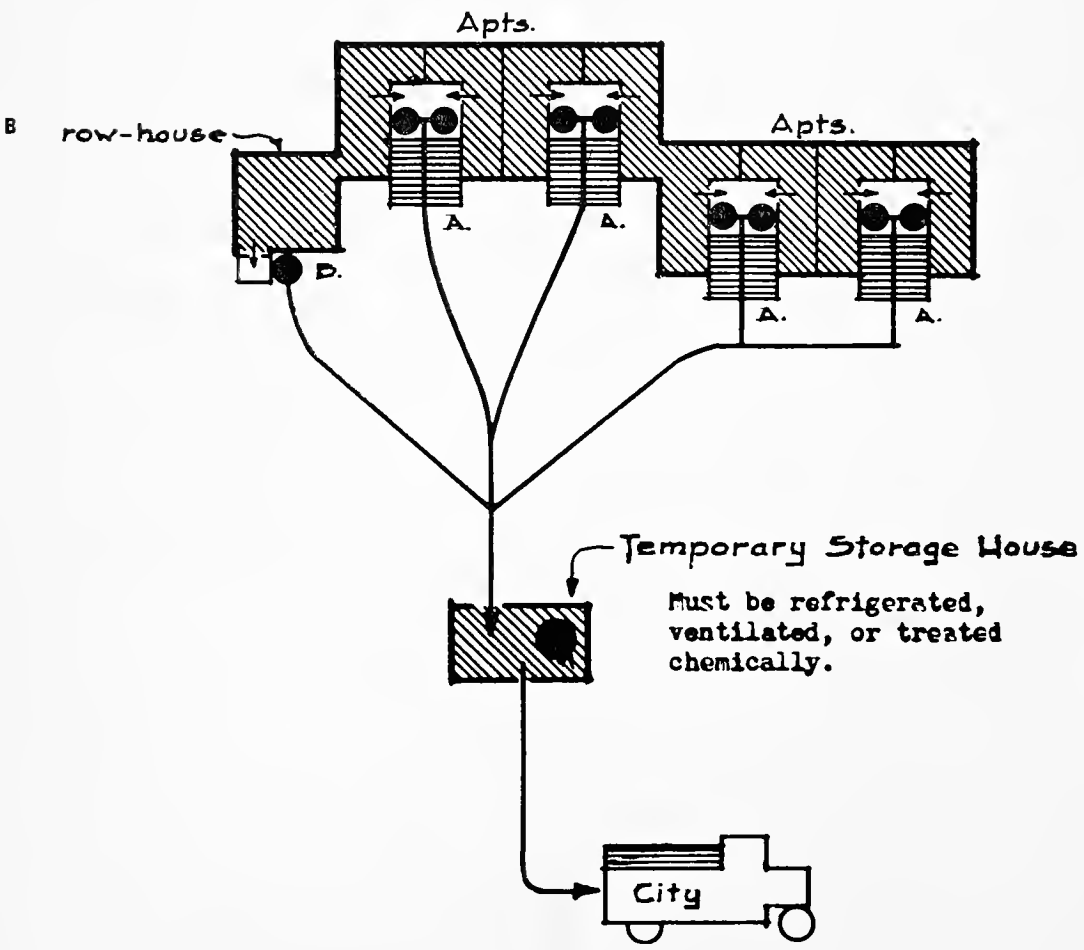
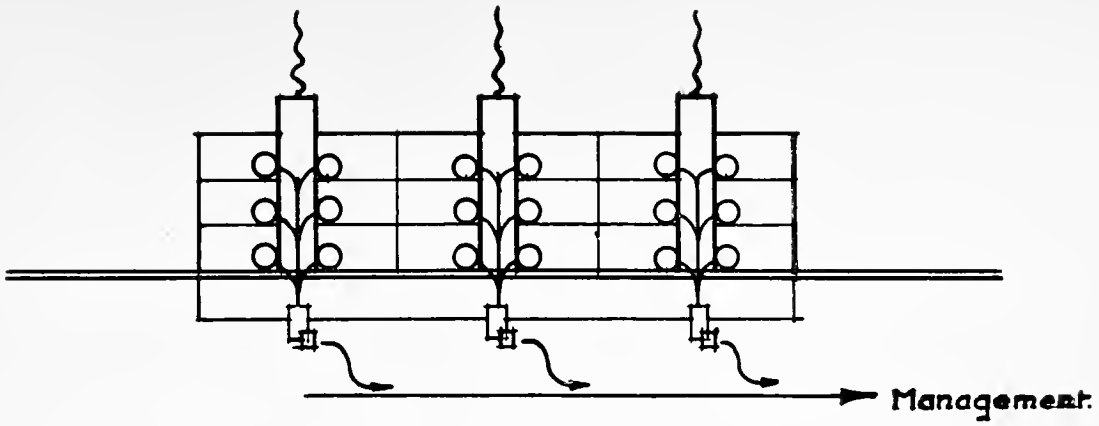


Figure 108. A. Removal of waste by either city or management from outside receptacles. B. A two-stage disposal system by periodic municipal removal. Rental Housing Division, Federal Housing Administration.





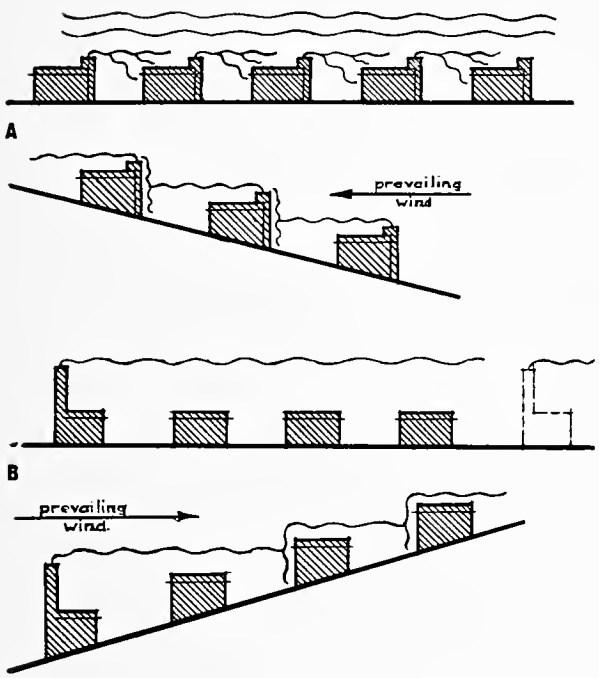


Figure 109 (above). Unit incinerators within buildings. Rental Housing Division, Federal Housing Administration. *Figure 110 (left). Problems arising from location of incinerators with individual incinerators (A) and with a central plant (B).* Rental Housing Division, Federal Housing Administration.

Incinerators A method of avoiding much of the hauling of trash and garbage is the use of incinerators accessible to tenants in each building. When they are used, the only hauling necessary is the removal of unconsumed matter from the incinerator grate and of such articles of trash as are incombustible or too bulky to insert in the incinerator hoppers. Incinerators are expensive and, except for high-rental projects, are seldom used where one flue serves less than six families. Multiple incinerators in low buildings also give rise to certain problems of smoke and odor, which are illustrated in Figure 110. If multiple incinerators are used, they ought to be of adequate size. In an attempt to save space, the flues are frequently made too small, resulting in frequent stoppage and poor combustion. Minimum dimension should be 16″ x 16″.

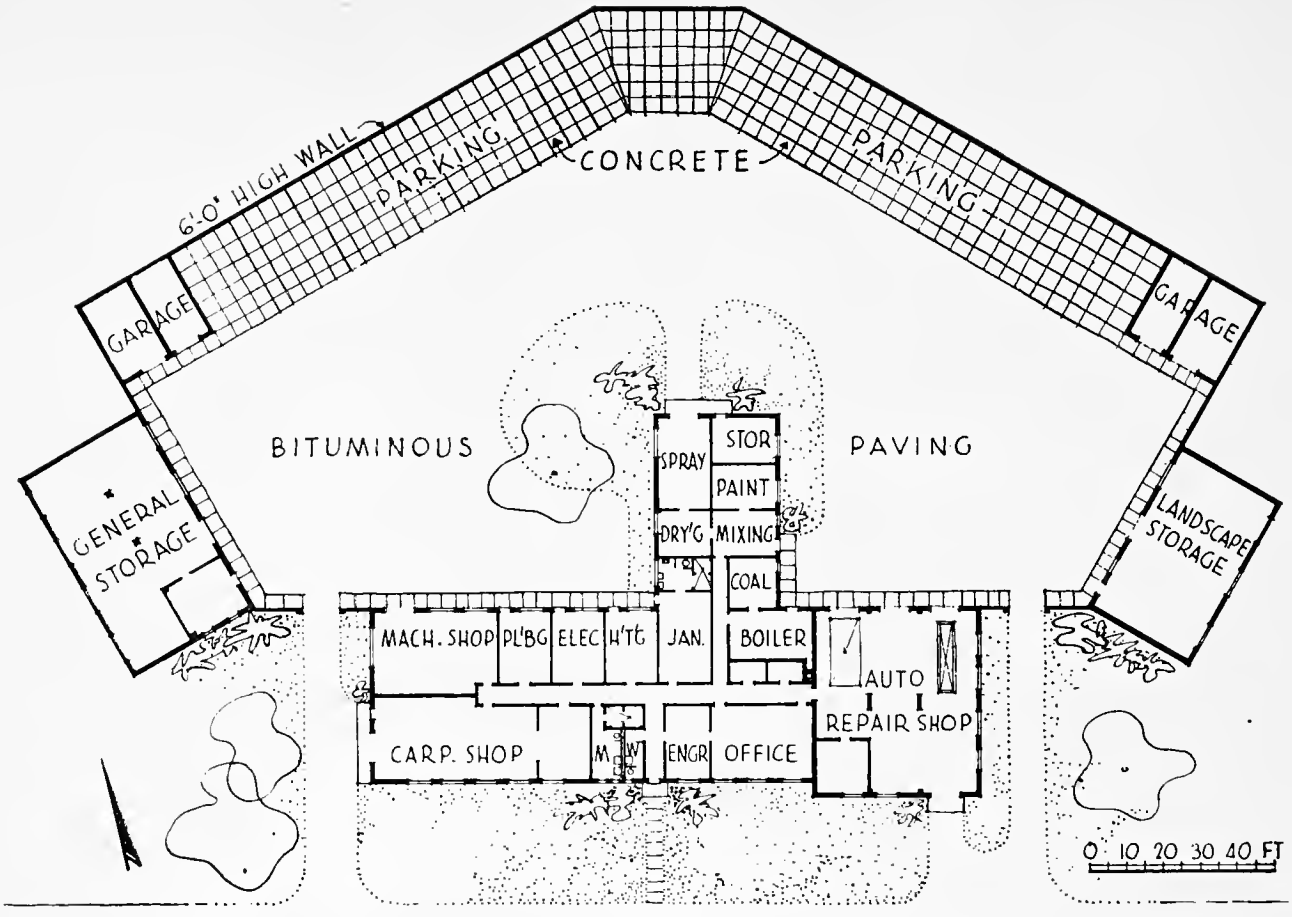


Figure 111. Maintenance buildings, Greenbelt, Maryland. Victorine Homsey and Eugene Henry Klaber, associated architects.

requirements of management

Every rental housing project, regardless of size, requires space available to the management in order that it may function properly. In larger groups it may need offices for maintenance of records, renting, and collection of rents. It is impossible to establish norms of required management space. In a given instance architects may have to plan for the following:

1. Repair of the buildings
2. Cleaning of halls, staircases, and other public space within the buildings
3. Removal of waste
4. Care of grounds, walks, driveways, parking areas, and garages
5. Snow removal
6. Seasonal storage, screens, storm windows, and the like
7. Storage of trucks and cans for waste; supplies of all sorts; garden tools, lawn mowers, snow shovels and plows

8. Storage of autos and trucks and their repair
9. Provisions for personnel, toilets, lockers, and uniforms
10. Mechanical repair shops

Satisfying these requirements is a distinct phase of the planning process. Architects can do this best if they have the assistance of a trained manager who will head the operation. It is evident that, depending on the size and nature of the operation, the space allocation may range from a single room to a group of buildings designed for the purpose. Such a group is shown in Figure 111, which was designed for a suburban development of about two thousand families.

provisions for deliveries

In site planning, study must be given to the routing of deliveries. Although this factor is not the principal determinant of a site plan, it will prompt possible modification if delivery routes are found to be excessively long or tortuous. This is of special importance for services which occur daily. The milkman, the trash collectors, meter readers, and postman must cover the entire project. Too much back and forth by the milkman may mean late delivery. The acceptability of the mail route should be discussed with the local post offices.

Occasional deliveries present fewer problems since they may be made to only one or a few tenants. This type includes delivery from department stores, food markets, and drug stores. On the other hand, van deliveries and removal of furniture must be studied in relation to grades and the distance from the point of unloading.

Regardless of the type of delivery, no dwelling entrance should be over 275 feet from an unloading point. This also applies to parking areas. Walking with an armful of groceries isn't fun, and a trip back to the car to finish unloading the week's marketing may be a hardship.

PART II: SITE PLANNING

Site Selection

A housing development may consist of a single building or of many. In the former case the architect usually has a limited terrain at his disposal, and his site planning efforts will be directed toward the sometimes futile task of providing a required number of rooms, at the same time giving adequate light, ventilation, and a modicum of privacy to each, regardless of what may be built by owners of adjacent property, which may be only a few feet away from the walls of his building. In larger projects with less necessary coverage, he is freer to achieve these aims. His choice of building arrangement is greater; he at least has a chance to produce something that transcends mere physical requirements, and by its massing, articulation, and setting may create beauty.

Frequently the architect has no influence on the choice of site; he takes what he gets and makes the best of it, but developers of housing projects increasingly are aware that the architect should play his part in site selection as one of a team of advisors with both professional and managerial experience. He should therefore understand the ramified considerations which affect the choice of a site. The relative importance of the factors to be evaluated will vary, depending on whether the proposed occupants are wealthy families or those of medium or low income.

If high rentals or sales prices are contemplated, the question of obsolescence is of paramount importance. High-rental buildings have a comparatively narrow and highly competitive market; they appeal to today's fashion, but today's fashion is tomorrow's dowdiness. Hence they are dependent on the choice of sites either of special convenience or of unusual amenity to maintain their appeal after the buildings themselves have ceased to be the latest word in swank. Central sites depend on the availability of restaurants, theaters, concert halls, night clubs, fashionable shops, and other resorts where the surplus of income over basic needs can readily be spent. More remote locations must offer the prospect of sustained appeal, for example, sites facing Central Park in New York, Lake Shore Drive in Chicago, and San Francisco Bay.

In judging the desirability of a site for low-cost or medium-cost housing, other elements assume importance—transportation, access to work, schools, recreation, etc. Comparatively low cost of land is essential. This does not mean raw land but land ready for building with cost of roads, utilities, heavy grading, and special foundation work, if any, included. High land cost for low-rent housing means subsidy.

Since we are concerned with design, our discussion will be largely of the physical characteristics of the site which affect planning, and we shall content ourselves with an outline list of other highly important fac-

tors which must be considered.*

Legal and Financial

1. Conformity with master plans.

2. Zoning ordinances: (a) Conformity with requirements. (b) Local practice with respect to variances.

3. Deed restrictions.

4. Existing rights of way or easements.

5. Attitude of potential lenders to choice of site. Acceptability to F.H.A. if mortgage insurance is contemplated.

6. Assessment and taxation, present practice and trends.

7. Land assembly and acquisition of title: (a) Number of present owners. (b) Possible hindrances to acquisition, land held in trust, owners who cannot be found. (c) Land in litigation.

8. Cost of land, ready to build.

9. Equity requirements of the financial setup.

Community Factors

1. Availability of water, gas, electricity, and sewers: (a) Cost of necessary off-site extensions. (b) Capacity of existing facilities to take added load.

2. Services rendered by community: (a) Police and fire protection. (b) Waste removal. (c) Street cleaning and snow removal.

3. Schools; distance from site and capacity of elementary and high schools. Municipal program of school expansion.

4. Hospitals, clinics, and health centers.

5. Libraries.

6. Major recreational areas.

7. Location of centers of employment.

8. Transportation: (a) Types of public transportation available or projected. (b) Travel time to important centers. (c) Fares.

Neighborhood Factors

1. Character of existing neighborhood, if there is one. (a) Evidences of health or blight. (b) Can trends toward blight be reversed? (c) Will proposed development attract occupants despite existing adverse conditions?

2. If no neighborhood exists: (a) Is there a plan of future land use? (b) Of street pattern? (c) If neither, are there evidences of possible future trends?

3. Shopping facilities.

4. Theatres, bowling alleys, and other commercial recreational facilities.

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*For an excellent discussion of this theme see *Apartment Houses* by Joseph H. Abel and Fred N. Severud, Reinhold Publishing Corporation.

5. Public parks and playgrounds existing or projected.
6. Churches, clubs, youth organizations.

physical characteristics

There are certain adverse elements which may warrant the rejection of a proposed building site for housing of any kind, including the following:

1. Periodic flooding of the Nile is the life blood of Egyptian agriculture; it is a menace to the inhabitants of the low-lying parts of cities along the Mississippi, Missouri, and Ohio rivers. If any substantial part of a site is subject to flood, it should be rejected. If a small proportion of the area is periodically under water, the site nevertheless may be acceptable, provided that no buildings are erected at the low points. In such cases the cost of land per unit of area should be based on the net area of usable land.

2. Areas frequently blanketed by fog should be avoided. Occasional, even periodic fog should be judged on the basis of average duration of the condition. Carrying this principle to its extremes would wipe out most of London and San Francisco, which would be deplorable.

3. Land subject to subsidence is dangerous. This does not mean soil of low-bearing capacity whose shortcomings can be corrected, but rather soil on which sinking would cause collapse of the structure. In some mining towns the galleries honeycomb the earth near the surface and failure of the soil means a drop—not merely a sinking.

4. Smoke and industrial odors. If a source of heavy smoke is near, a site is valueless for housing, at least until the community emulates the heroic smoke elimination measures of St. Louis and Pittsburgh. Industrial odors cause blight and loss of value in residential areas. If the odors from the oil refineries in southwest Philadelphia were to cease, the value of property and consequently the tax return to the city from the affected area would increase measurably. Similarly a large area of the south side of Chicago is blighted by the perfume of the stock yards.

5. Noise. It is difficult to measure accurately the adverse effect of noise on people whose homes are surrounded by urban din. There may be ultimate effects which are not immediately observable. Obviously, where possible, a quiet environment adds to the amenity of living. But human beings have a way of adapting themselves to accustomed noises. People whose homes face the elevated railroad gradually become unconscious of the passing trains. The same is true of heavy traffic arteries. It is the occasional noises which are really disturbing; the alarm clock by the bedside, the shrieking infant, static roars on the radio, factory whistles and sirens, ambulances and fire engines in the street, airplanes flying at low altitudes. A railroad line nearby may be tolerable, especially if a screen of evergreens is planted to interrupt the sound waves, but railroad stations and terminals and, above all, switching yards, are bad neighbors.

6. Traffic arteries passing through a site create hazards which warrant its rejection for housing; mothers must not be burdened by constant fear of injury to their children.

We have noted that finished cost of the land is an important consideration in medium and low cost housing. What physical characteristics give promise of low cost land for low cost housing?

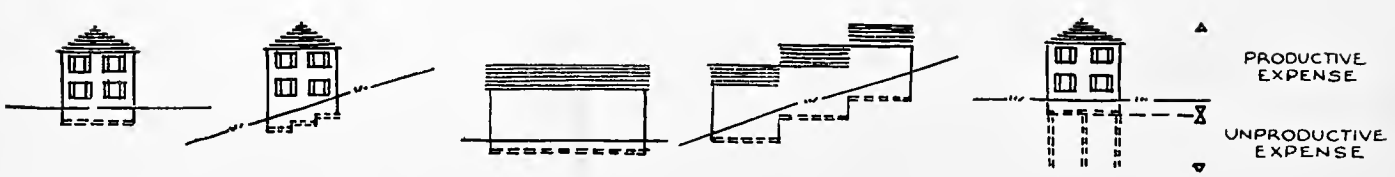
1. Topography. Sites with moderate slopes are preferable to those with sharp grades, especially for projects of small or medium size (Figure 113). Plans A and B have approximately the same number of dwelling units. It will be evident at once that the land development costs of A are greater than those of B: more road and sidewalk length, higher cost of utilities. In these drawings the contrast has been exaggerated to emphasize the point. Of course, if the raw land cost of A is sufficiently less than that of B to counterbalance the added development costs, there will be no monetary advantage in either site, and A might well be chosen for the wider outlook which it affords and the informality of the layout. Of the two, the fire department would doubtless prefer B for its own convenience, but fires do not take place every day and living does! In large projects the differences in cost may not be as marked since the roads following the contours would serve a larger number of dwelling units.

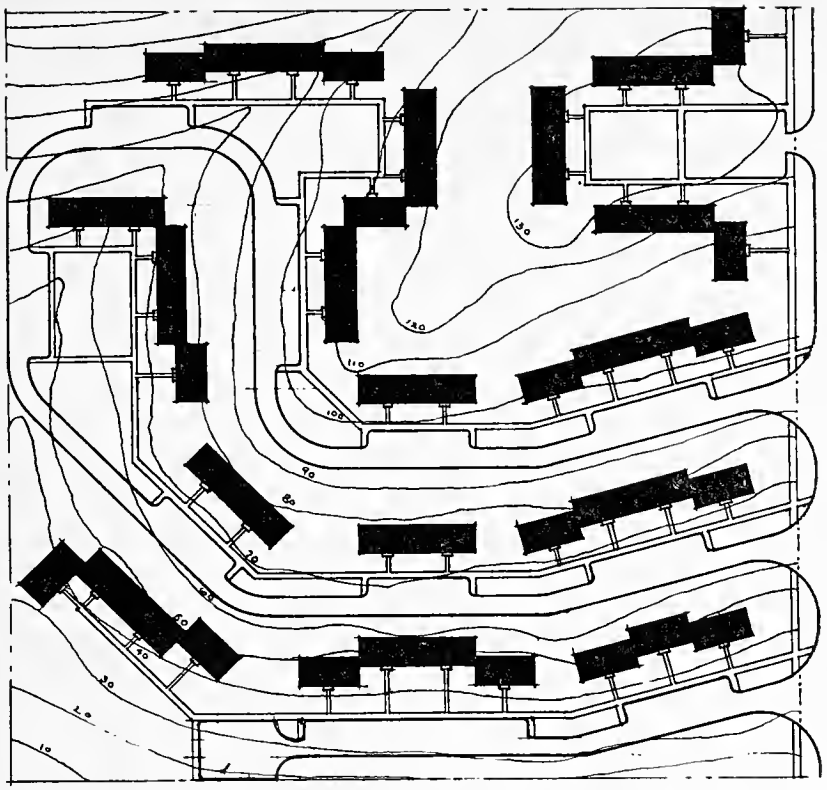
Steeply sloping sites necessitate added foundation walls (Figure 112). Unless the increase creates additional usable space, the extra walls are in effect a land development cost.

2. Sites with soft ground, uncompacted fill, or outcroppings of rock are more expensive to develop. Rock blasting and pile foundations produce no income to compensate for the cost. Other things being equal, such sites should be avoided. Again, if only small portions of a large site present these conditions and the buildings can be located to avoid them, they are entirely tolerable and offer opportunities for recreational areas.

3. If the size of a site requires road construction, locations where heavy-duty roads are not required by municipal regulations are to be preferred, since a housing project does not need them for its own purposes. Lighter blacktop roads will usually be adequate.

Figure 112. Added foundation costs. Federal Housing Administration.





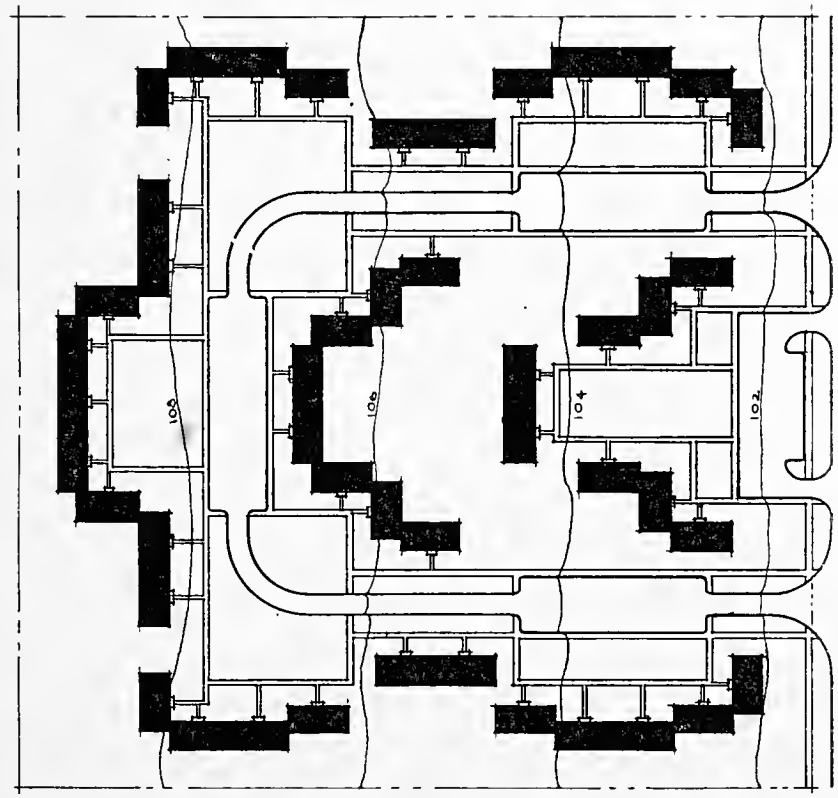


Figure 113. Topography influences site planning. **Federal Housing Administration.**

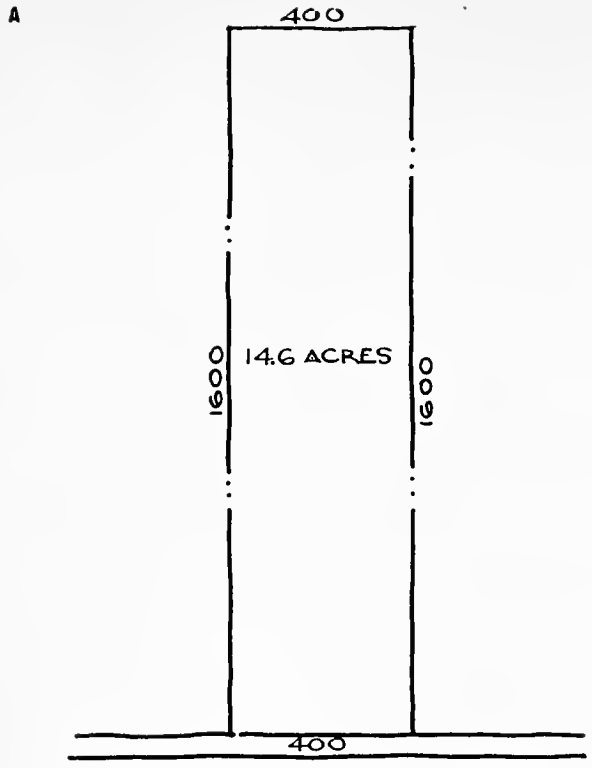
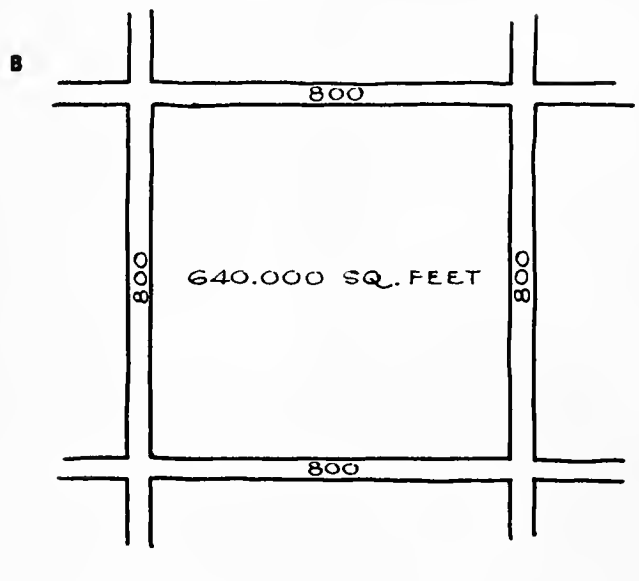
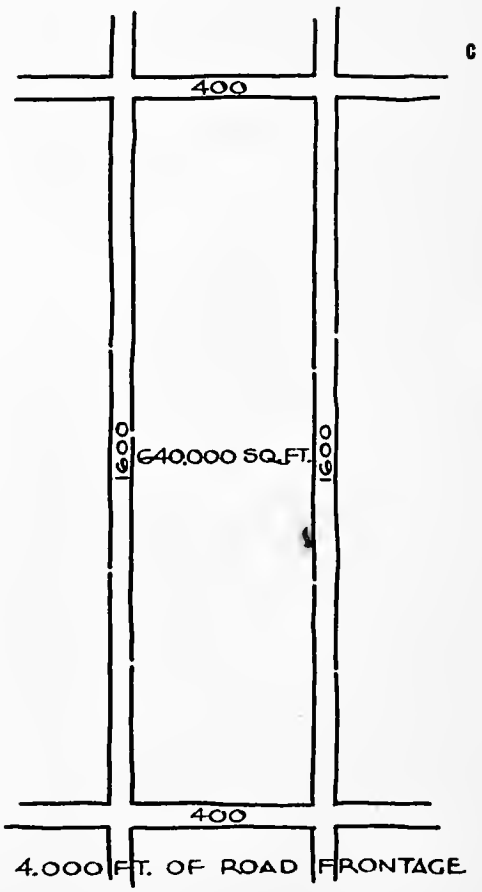


Figure 114. Shape of site and perimetrical roads. Federal Housing Administration.





4. Sites remote from public utilities and roads may be prohibitive in final cost. These facilities must be extended to the site. These offsite extensions are not covered by a mortgage, if there is one; hence the developer must pay them out of capital funds other than the equity money required by the mortgage contract.

5. Existing perimetrical roads are almost always an advantage, since they can serve the buildings of the project. Compare A and C, Figure 114. It is evident that C will need little additional road construction, whereas A, with the same area but lying between party lines, requires extensive drives within the property.

6. Where perimeter roads must be constructed, of two sites of equal area, the one most nearly square will have the lesser cost. Thus in Figure 114, plan C requires 25% more road than B.

7. The presence of utilities at a proposed site is not enough; they must be of adequate capacity to carry the added loads created by the project. If water and sewer mains must be replaced, they might as well not be there. Should a site be chosen where sewers are not available, septic tanks may be used, either as a final method of disposal or as a temporary expedient pending the extension of a municipal sewer system. In either event, three things are necessary: there must be room for a disposal field of adequate size, the soil must be capable of absorbing the outflow of water, and approval of the system must be secured from the local authority having jurisdiction.

8. Existing shade trees on a site are a valuable asset. Too often a developer will cut down all the trees on a site because they may interfere with his predetermined layout of buildings or because his grading has not been planned to preserve the trees. When the job is done, he salves his conscience by planting seedlings at forty foot intervals along the curbs. On wooded properties the architect should have the advice of the landscape architect, who is an essential member of the professional team and who should be chosen at the very outset of the enterprise.

It is impossible to discuss all the problems of site selection in a single chapter, nor is it to be expected that any one site will have all desirable characteristics. It then becomes a matter of judgment to determine the important factors to be considered and to base a decision on them.

Orientation

In housing, orientation is the placing of buildings in such a position that the maximum number of dwelling units and of their principal rooms may enjoy the specific advantages of the direction they face or avoid the disadvantages of some other direction. It involves important choices by the architect. The principal physical elements which will affect his choice are the following:

1. *Sunlight* Should his plan be arranged to permit the maximum of sunlight to enter the rooms, especially in winter, or should rooms by preference face away from the sun because of unbearable summer heat?

2. *Prevailing winds* Can he arrange to take advantage of cooling summer breezes and at the same time avoid the bitter gales of winter?

3. *Views* If a housing site enjoys a particularly desirable outlook in one or more directions, the layout of the site plan may capitalize this advantage, be it a distant view afforded by sloping topography, a more restricted view over an adjacent public park, or even an outlook over the center field fence of the ball park. On the other hand the architect may wish his buildings to avoid the sight of adjacent developments, blighted areas, messy industrial uses, or potential adverse use because of differences in zoning.

4. *Airborne noises* If a housing site is completely surrounded by noisy streets, the effort will be to face most rooms toward the interior of the property and give some measure of protection to those on the perimeter. If there is a single direction of objectionable noise (e.g. a machine shop), the dwelling units will be crowded away from the source and the sound waves muffled as much as possible.

5. *Existing street pattern* Frequently the architect must deal with a layout of streets or roads which cannot be modified because of existing rights or unwillingness of local authorities to change the prevailing pattern or permit the vacation of streets. Especially with narrow blocks, this makes the problem of securing adequate open space, light, and circulation of air difficult and often well-nigh impossible. What methods can he use to aid his efforts?

6. *Size and shape of lots* What can be done with the small prop-

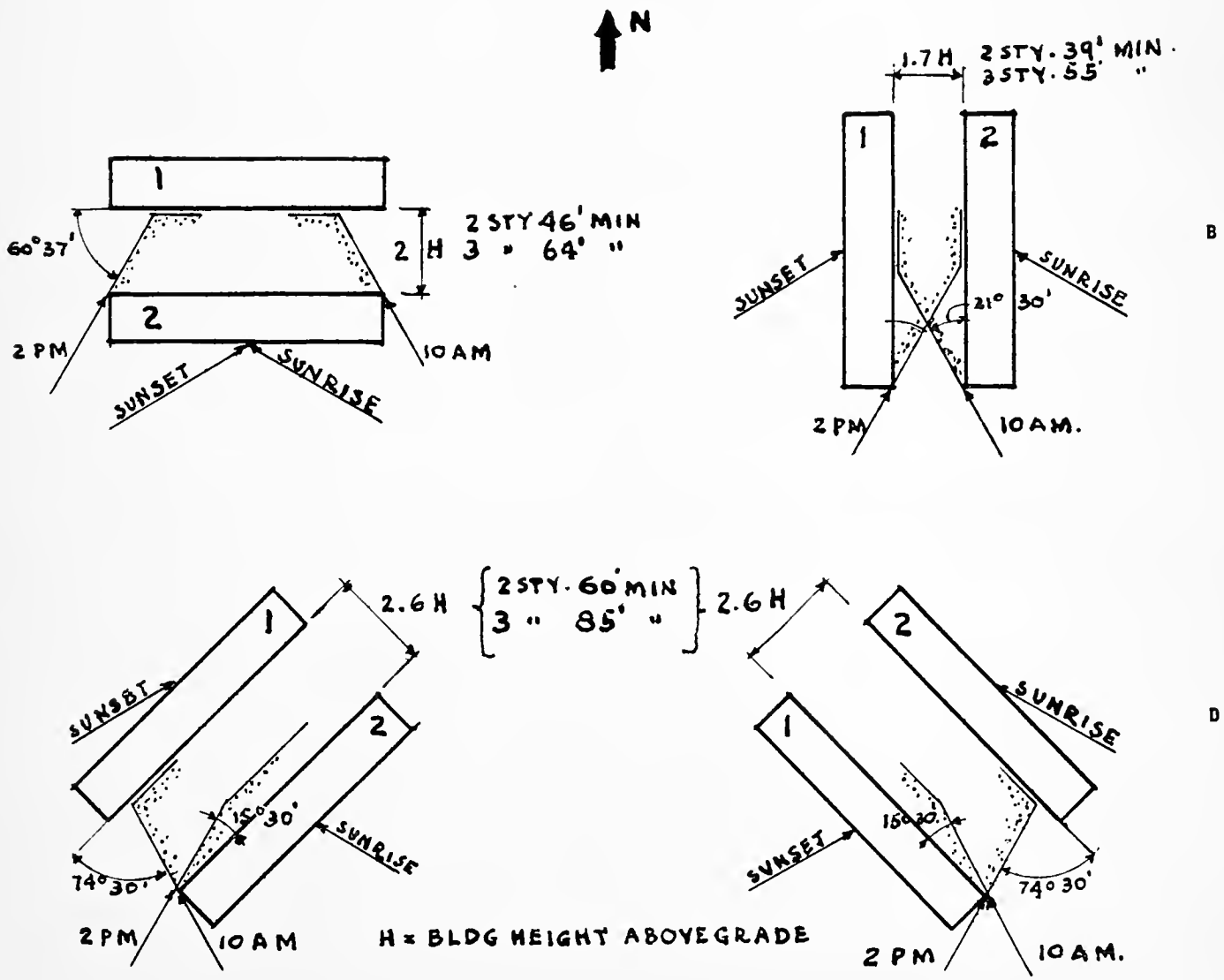
before sunset; building 2, two hours after sunrise. In the middle of the day neither enjoys good insolation because of the sharp horizontal angle.

In C, building 1, southeast side, good sunlight 10 a.m. to 12 m.; building 2, southeast side, good sun 7:30 a.m. to 12 m. Neither building has good sun after noon.

In D, building 1, southwest side, good sun noon to 4:30 p.m.; building 2, southwest side, good sun noon to 2 p.m. Neither building has good insolation before noon.

There are the facts—take your pick!

Figure 117. Spacing of parallel buildings to avoid shadows from 10 a.m. to 2 p.m. at 40° N. latitude at the winter solstice. A. East-west. B. North-south. C. Northeast-southwest. D. Northwest-southeast.



In what has preceded, it will be noted that almost never are both sides of a building well favored with sunlight. There may also be an indicated direction from which the buildings should be approached. Thus if a housing site is rectangular and surrounded by existing streets, it may be necessary in the interest of economy of construction or simplification of service to enter the buildings as directly as possible from existing sidewalks. If then there are preferential exposures, how are the principal rooms of a dwelling unit to be given the greatest advantage of the sun? Let us suppose that the intention is to build one-bedroom walkup apartments. Too often architects plan one satisfactory unit and repeat it regardless of location on the site, ignoring the problem. This is not necessary. Although it may not yield a perfect plan, it will hit nearer the mark to plan at least two units, in one of which the living room and bedroom are on the same side as the entrance stairs, in the other on the opposite side. This has been done in Figure 118. In the plot plans, Figure 119, two preferred exposures have been assumed. By using two different unit plans it has been possible in every case to give the main rooms one of these two exposures. This same method can be used in taking advantage of desirable views.

prevailing winds

Desirable as it is, there are many cases in which buildings cannot be placed to take advantage of prevailing winds. If the terrain is small or if existing street patterns must be adhered to, it may be impossible. Where there is a choice, wind direction may be an important determinant of the site plan. Its importance varies in different sections of the country; in some cases it is an impelling consideration. We cite the following as examples:

New York In summer, breezes vary from southeast to southwest. Northeast winds usually bring rain. Northwest gales make life miserable in winter. Incidentally, New York is the windiest city in the United States, not Chicago.

Chicago Southwest is the desirable summer exposure; temperature runs as high as 100 degrees. Winter brings winds from the northerly directions, and the thermometer may drop to minus 30 degrees.

San Antonio Because of extreme summer heat, bedrooms preferably face south, since breezes come from "down Mexico way."

San Francisco Throughout the year the city has a daily visitation during the morning from a damp wind blowing eastward off the Pacific. The Chamber of Commerce calls this a "mist"; visitors are more welcome if they do not use the word "fog."

In "Dwelling Units" we found the prerequisite of natural ventilation was difference of air pressure on adjacent or opposite walls of a dwelling unit. It follows that if you want to enjoy a breeze in summer your longest walls should be at right angles to its direction, and if you wish to

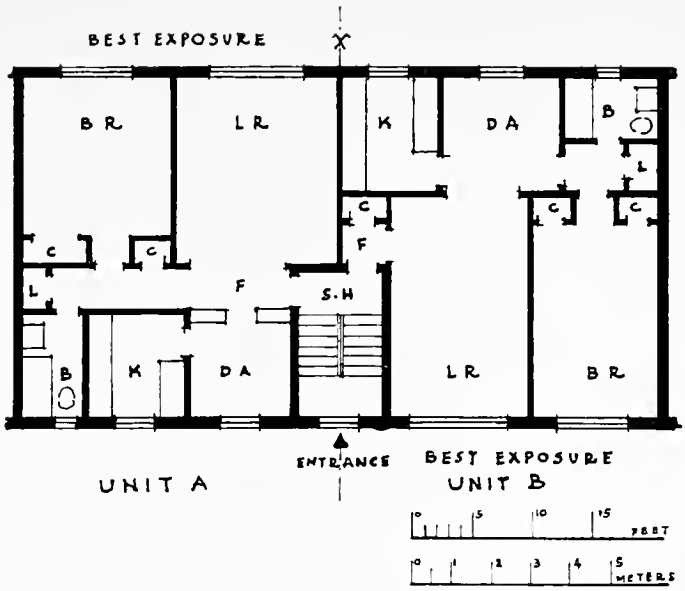
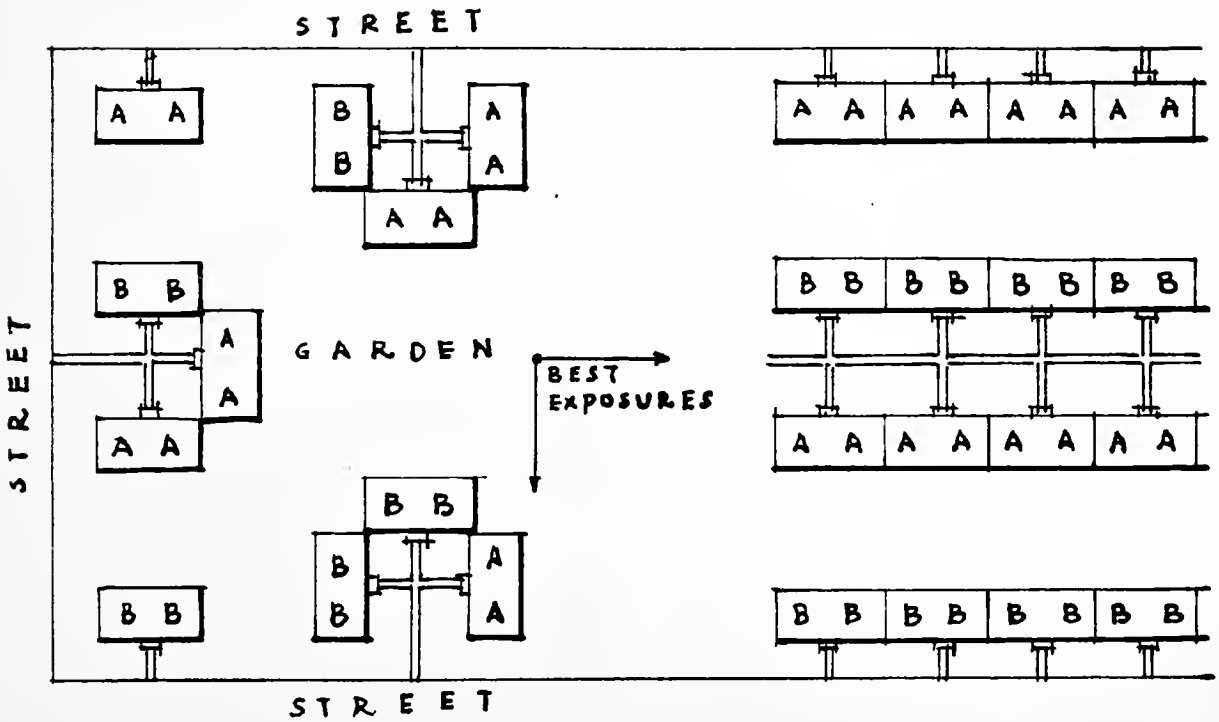


Figure 118 (above). Unit plans varied to enjoy preferred exposures. Figure 119 (below). Plot plans varied to enjoy preferred exposures.



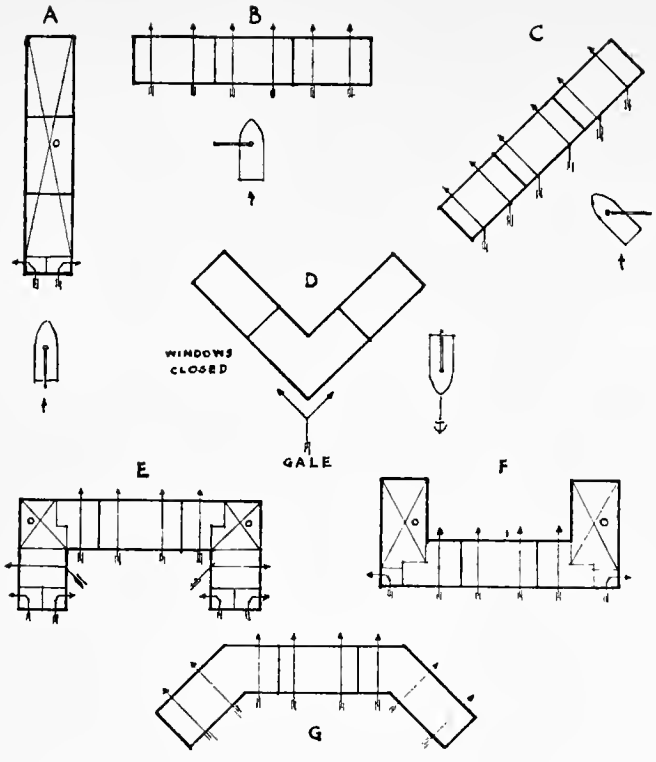


Figure 120. Trapping and avoiding winds.

avoid winter gales, you place your building so that they will slide by. Of course, since buildings do not rest on a pivot, it may not be possible to accomplish both of these objectives; in which case the buildings may be placed to take advantage of summer winds and sometimes may be screened by evergreen trees against January blasts.

Misconceptions as to capturing the wind are common. In a way, the same principles apply as in sailing a boat. This is illustrated in Figure 120. In A, the building will get very little advantage from the breeze, and the boat can't make much headway with the boom lashed to the tiller. In B, the building is broadside to the wind, as is the boom of the boat. At a given wind velocity the building will have a maximum of circulation and the boat attain its greatest speed. C shows an intermediate condition. D presumes a gale. The boat has its bow toward the wind and a sea anchor out to keep it off a lee shore; the building also points into the wind which slides along its sides.

The shape of a building may also affect the circulation of air inside it. Three examples are shown in Figure 120. Obviously, E and G are better than F when the wind is from the direction indicated.

In recent times the Federal Housing Administration has required that in developments of parallel row houses spaces be left open every so and so many houses to permit the wind to pass through one side and reach houses on the other. This nifty little device is called a "breezeway." Wheth-

er the houses are arranged as shown in A or B of Figure 121, it is quite futile. In A, the wind simply runs down the court and escapes. B ignores the fact that a wind passing over the roof of one building pulls downward of itself and strikes the building at the far side (Section X-X), very much as when a high tree is to windward of a house and creates a down draft in the chimney. A breezeway may be of use between comparatively high buildings as shown in C, but then only if a rear building spans the opening between those in front and is in the direct path of the wind.

view Where a site commands an outstanding view, the developer naturally wants to take advantage of it for as many dwelling units as possible. The success of his efforts depends on how much of the inside of the buildings has a view, not on what one sees from the garden or the entrance door. Except in gallery units, it is seldom possible to give a good view to all the principal rooms of a dwelling unit, but usually this can be done for a large percentage of living rooms.

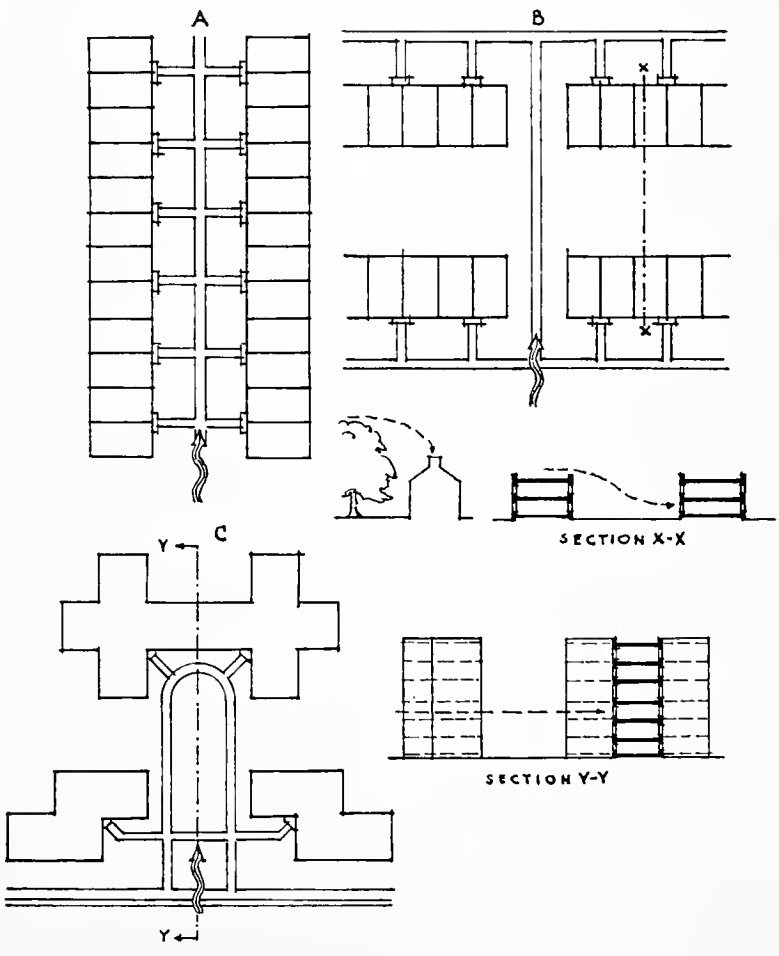


Figure 121. The "breezeway" fallacy.

We must first ask ourselves under what conditions a room may be said to have a view? The scene must be readily visible from points a reasonable distance from the windows; the angle of view must be sufficiently large that what one sees is more than a peep through a keyhole, and the center line of the view should not be at too obtuse an angle with the outside wall. If little Alice has to stub her nose against the window pane to see the boardwalk at the end of the street, she can hardly be said to enjoy a view of the ocean; indeed an angle of view of 30 degrees is perhaps a minimum. Figure 122 has been prepared for purposes of analysis. The outlook from three positions on a line four feet back of the window is studied with the center line of the room at varying angles with the direction of the view. The successive limitation of the outlook as the room is turned away from the direct view will be obvious.

These four diagrams assume a view which is not narrowed by other buildings or wings of the same building. Such a condition is shown in E. Here, living room X has a good view; the occupant of Y is looking through the knot-hole in the centerfield fence.

When outlook is a prime consideration, it may be necessary to have a number of variants in plan for the building units used, and the way the building units are oriented is of importance. A number of examples are shown in Figure 123. Note that the problem involved presents little difficulty with gallery units; with central corridor types 50% or more of dwelling units are likely to be ill favored.

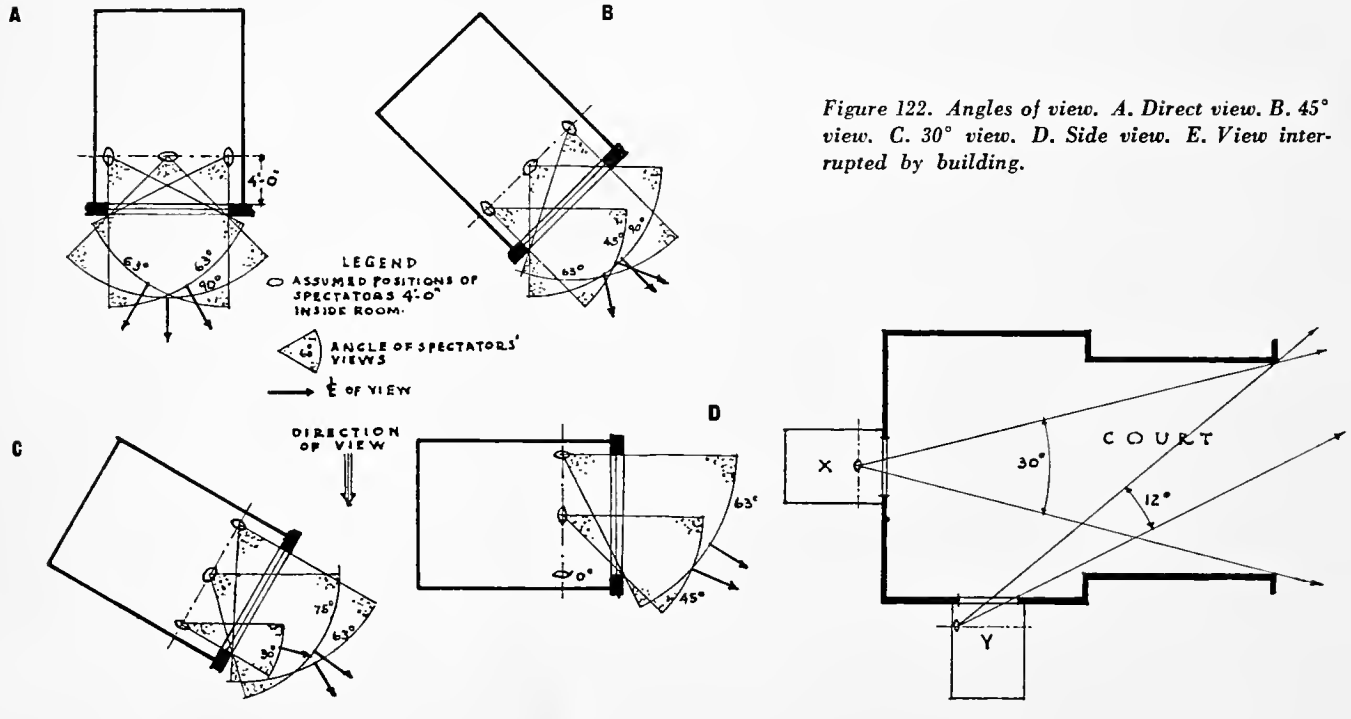


Figure 122. Angles of view. A. Direct view. B. 45° view. C. 30° view. D. Side view. E. View interrupted by building.

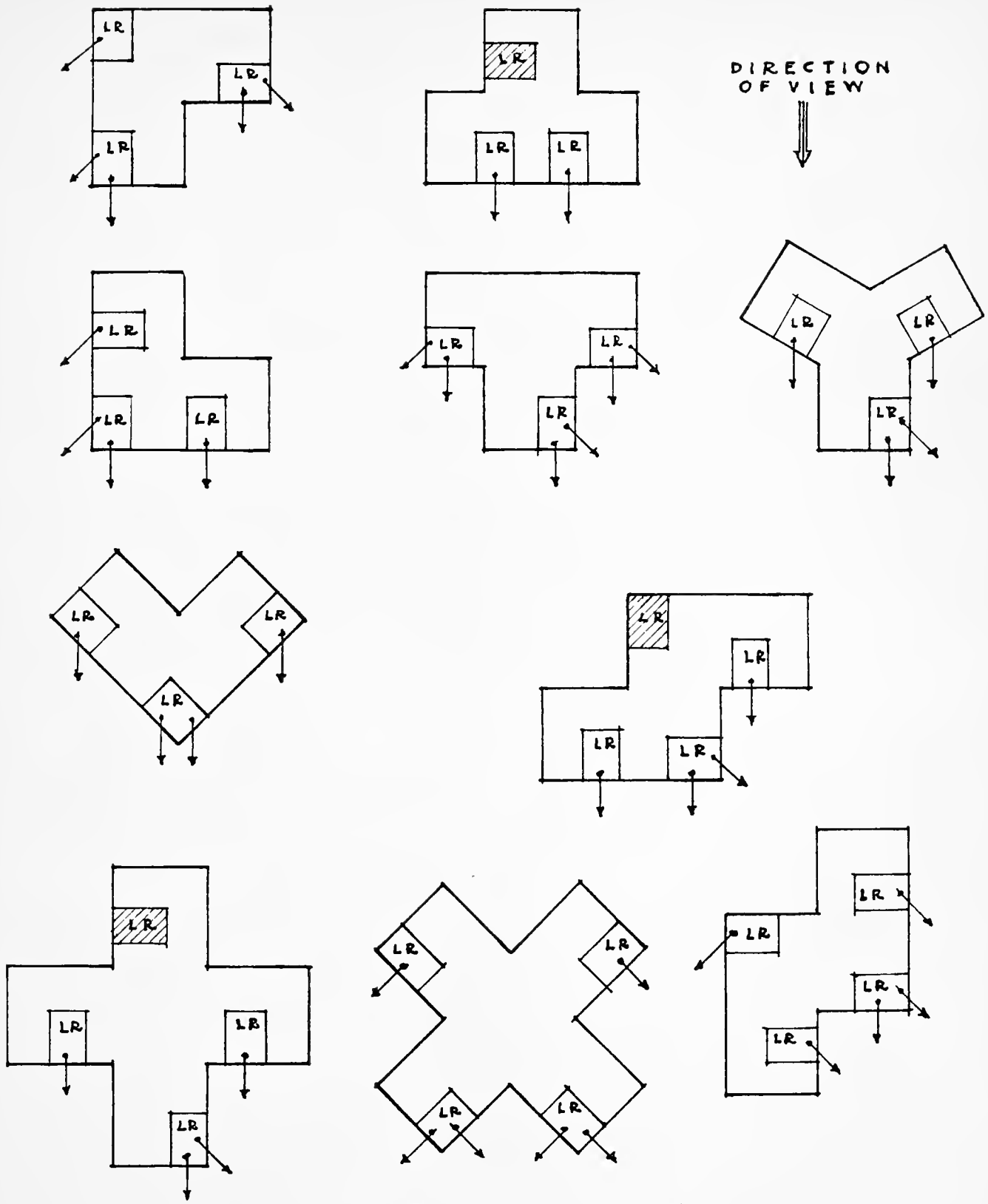
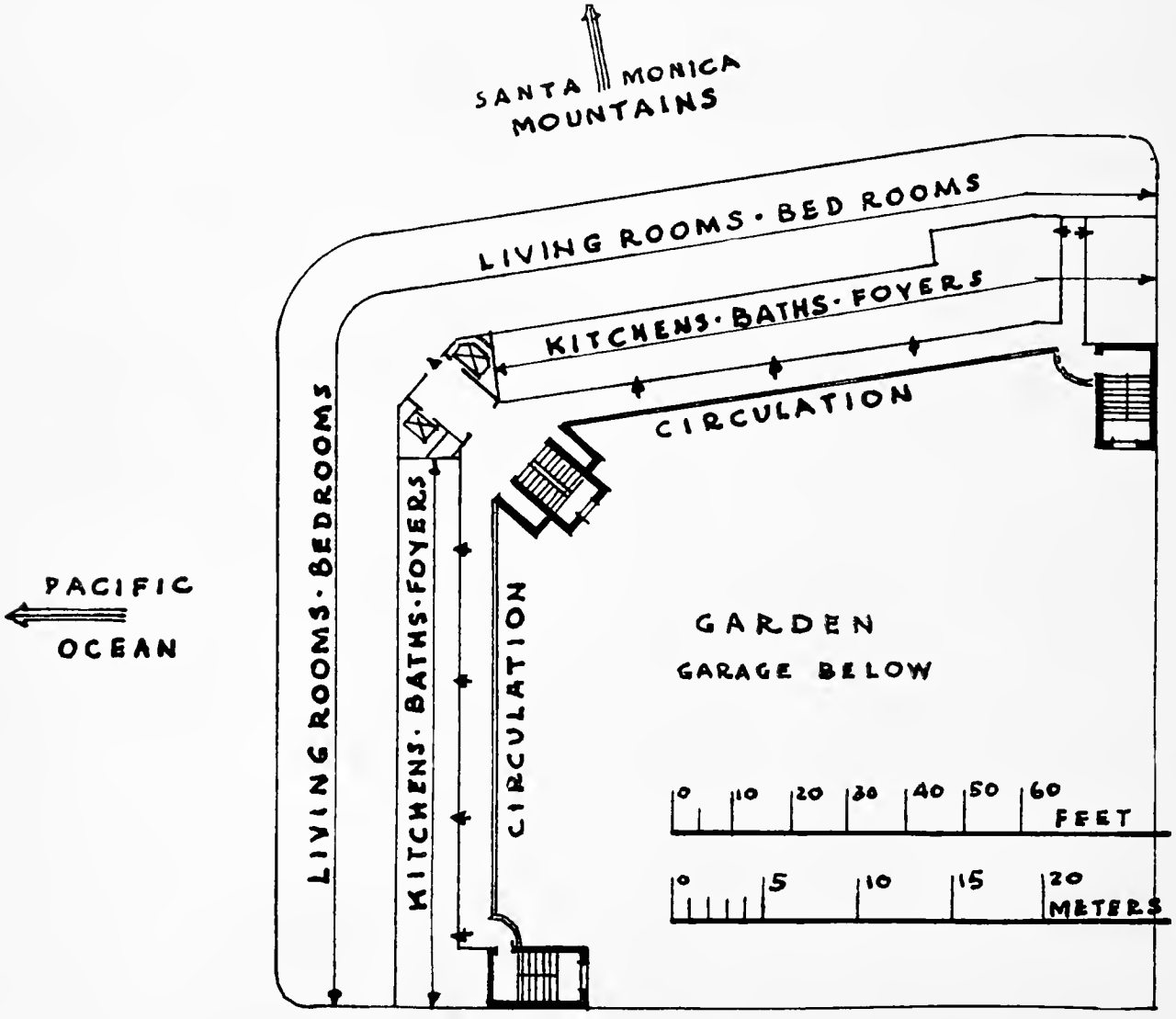


Figure 123. Building units in relation to preferential view.

Figure 125 shows four elementary groupings of strip units in relation to view. All have the same property width. In A, all buildings are broadside to the outlook and all living rooms face it directly. On the other hand, the line of buildings takes no advantage of depth of the property and blockades the view from any buildings in the rear, unless there is a substantial upward slope toward the rear (Section B). C, D, and E are attempts to use the depth to advantage, giving some living rooms direct and others diagonal views. The arrows show that E is an unsatisfactory scheme.

Figures 124, 126, 127, and 128 are examples of intelligent planning with prescribed orientation. In Figure 124, a single elevator building, the architect has made the view the keynote of the entire building plan.

Figure 124. Apartment building planned for view. Shangri-la Apartments, Santa Monica, California. William E. Foster, architect.



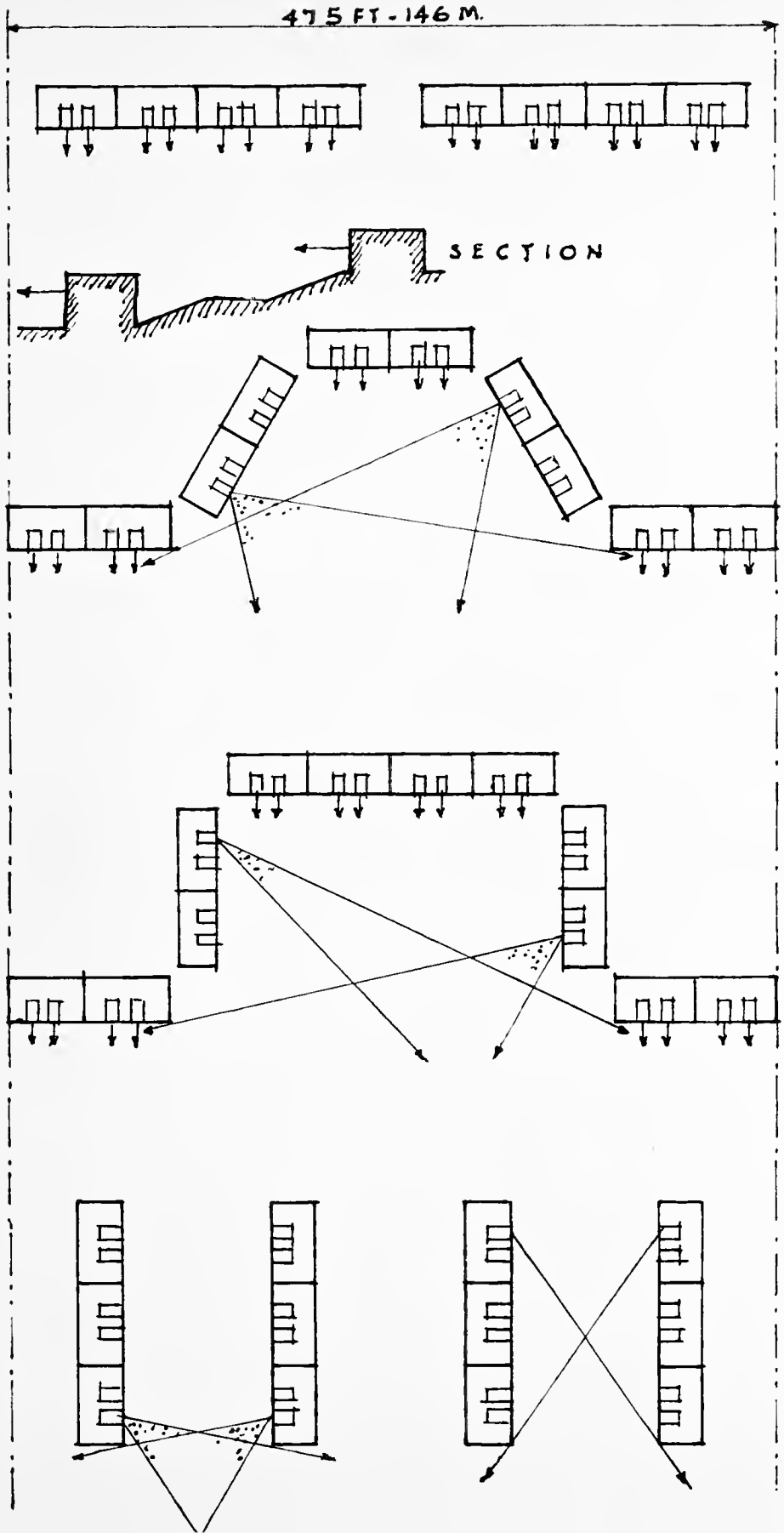
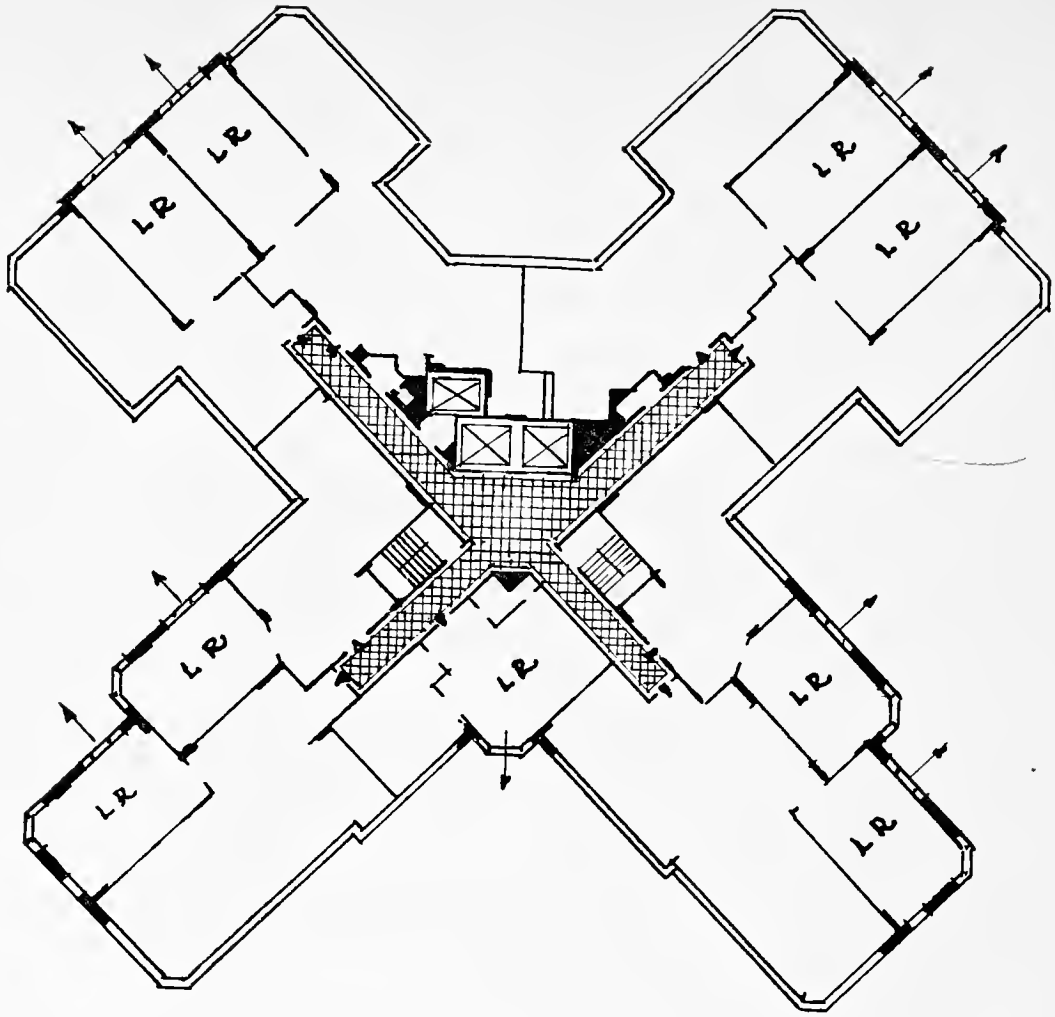


Figure 125. Building groups related to view. A. All eight strip units have a direct view. B. Rear buildings have a view only on steep slope. C. All ten strip units have good views. D. Ten of the twelve strip units have good views. E. Eight of the twelve strip units have poor views.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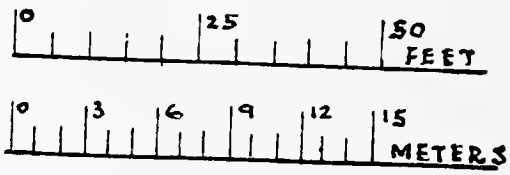
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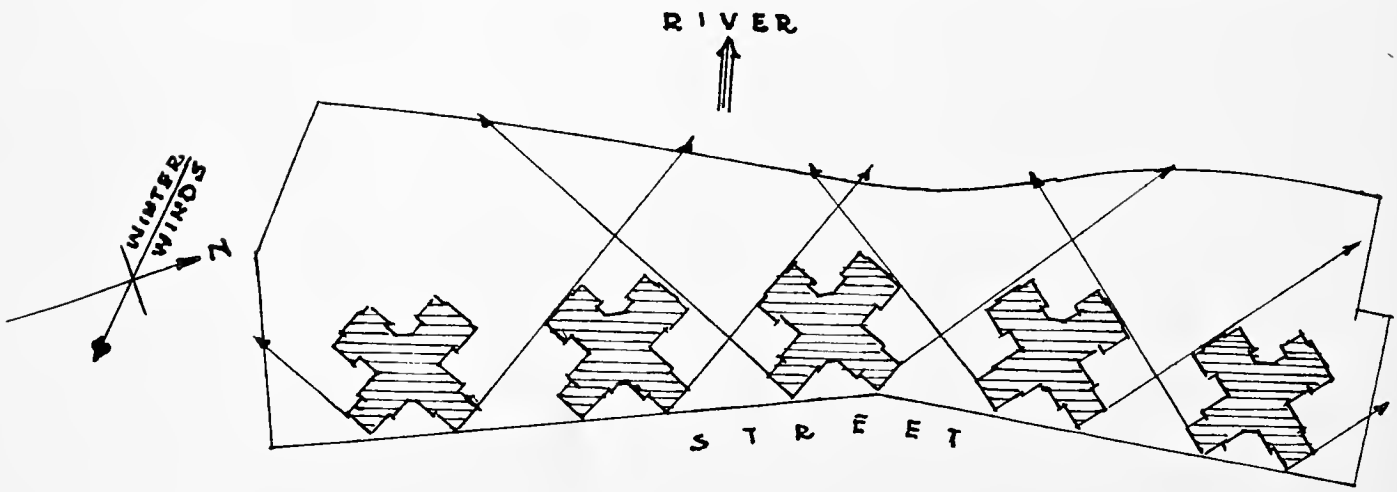
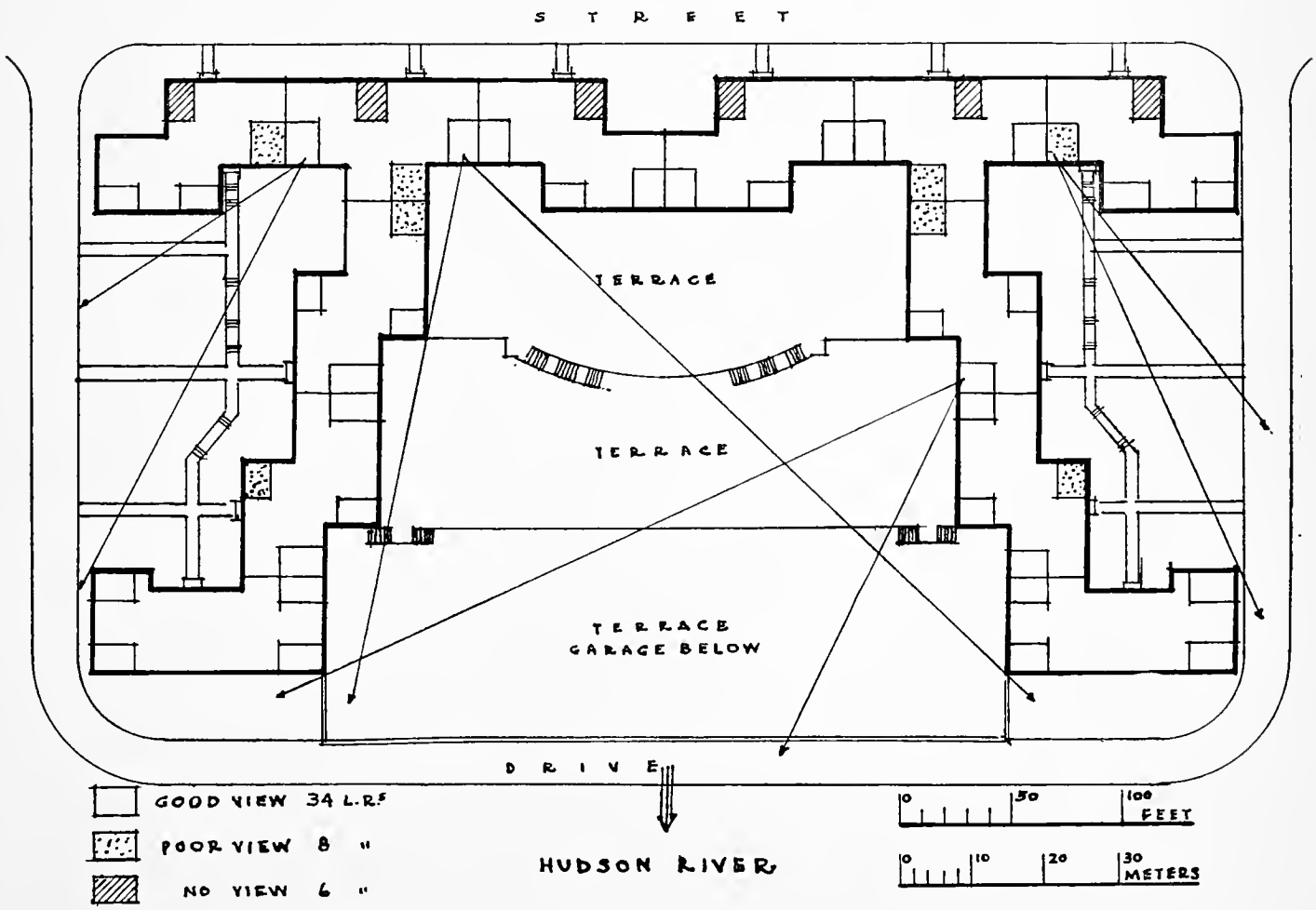

RIVER
WINTER WINDS
N
STREET

Figure 126 shows a group of five high-rise elevator buildings, enjoying a superb view of the Hudson River. The site plan has been skillfully arranged so that no building interferes with the view of another. By a brilliant tour-de-force the architect has laid out his unit plans so that the living rooms of eight of the nine apartments on the typical floor plan look out at the river. Evidently he decided that view was the predominant consideration to which all else must give way. Anyone who has felt the January gales racing across the Hudson, will know that this was no easy decision to make.

The previous example was built on a level terrain with high retaining walls facing the river side. Figure 127 was also planned for a site along the Hudson but with a steeply sloping site. It comprises six story elevator buildings arranged to open toward the river; 71% of the living rooms have good views, and only 12½% face away from it. This plan has two minor disadvantages: in some instances the entrance doors are at a distance from the driveway, and having parked his car, a tenant would have an uphill walk.

Figure 126 (left). Exploiting an outstanding view; 89% of the living rooms in this fourteen-story elevator building have a river view. George Fred Pelham, Jr., architect. *Figure 127 (right). Building group opening to view.* Harry A. Jaenicke, architect.



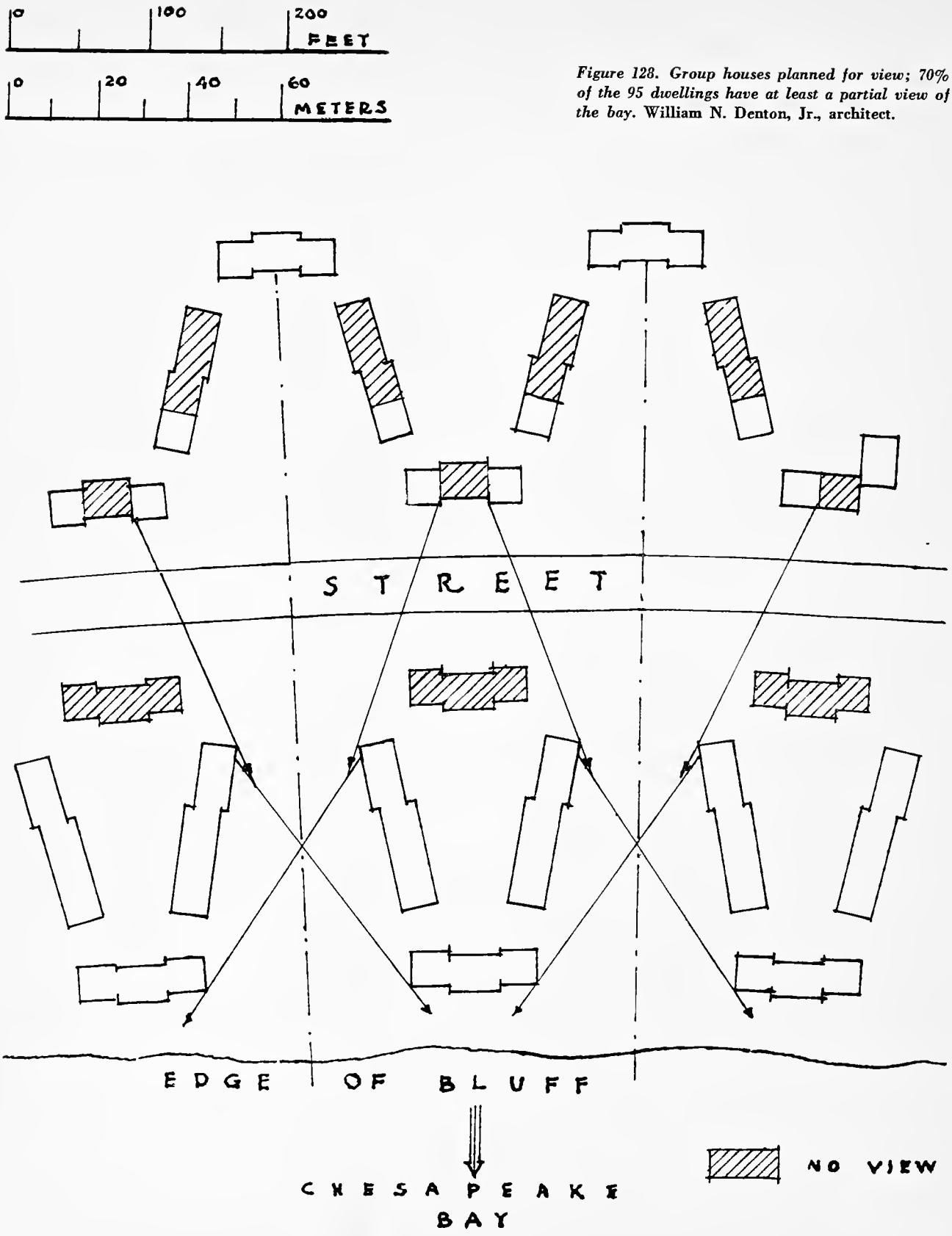


Figure 128. Group houses planned for view; 70% of the 95 dwellings have at least a partial view of the bay. William N. Denton, Jr., architect.

Figure 128 shows a group of one story and two story attached houses on a level terrain, slightly above the level of the adjacent water. In spite of the difficulty involved, the architect has provided some view for 70% of the dwelling units shown and a general feeling of openness.

So much for good views; what can we do when the outlooks from a site are bad in one or more directions? It is not always possible to avoid, but there are a few simple devices which may help (Figure 129).

Figure 129. Four methods of avoiding objectionable views: screening, putting ends of buildings toward view, sacrificing outlook of a few, putting your worst foot backward.

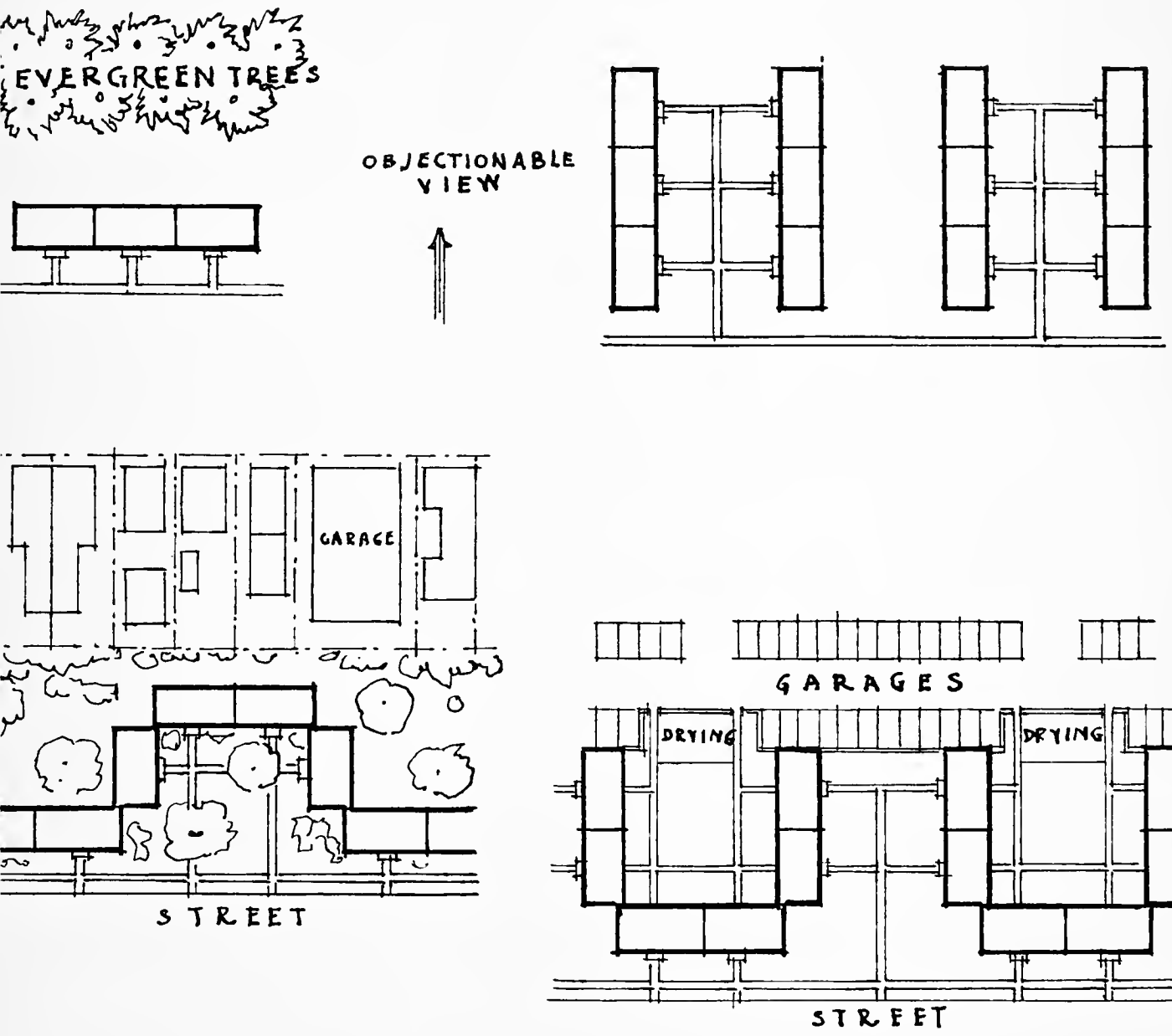
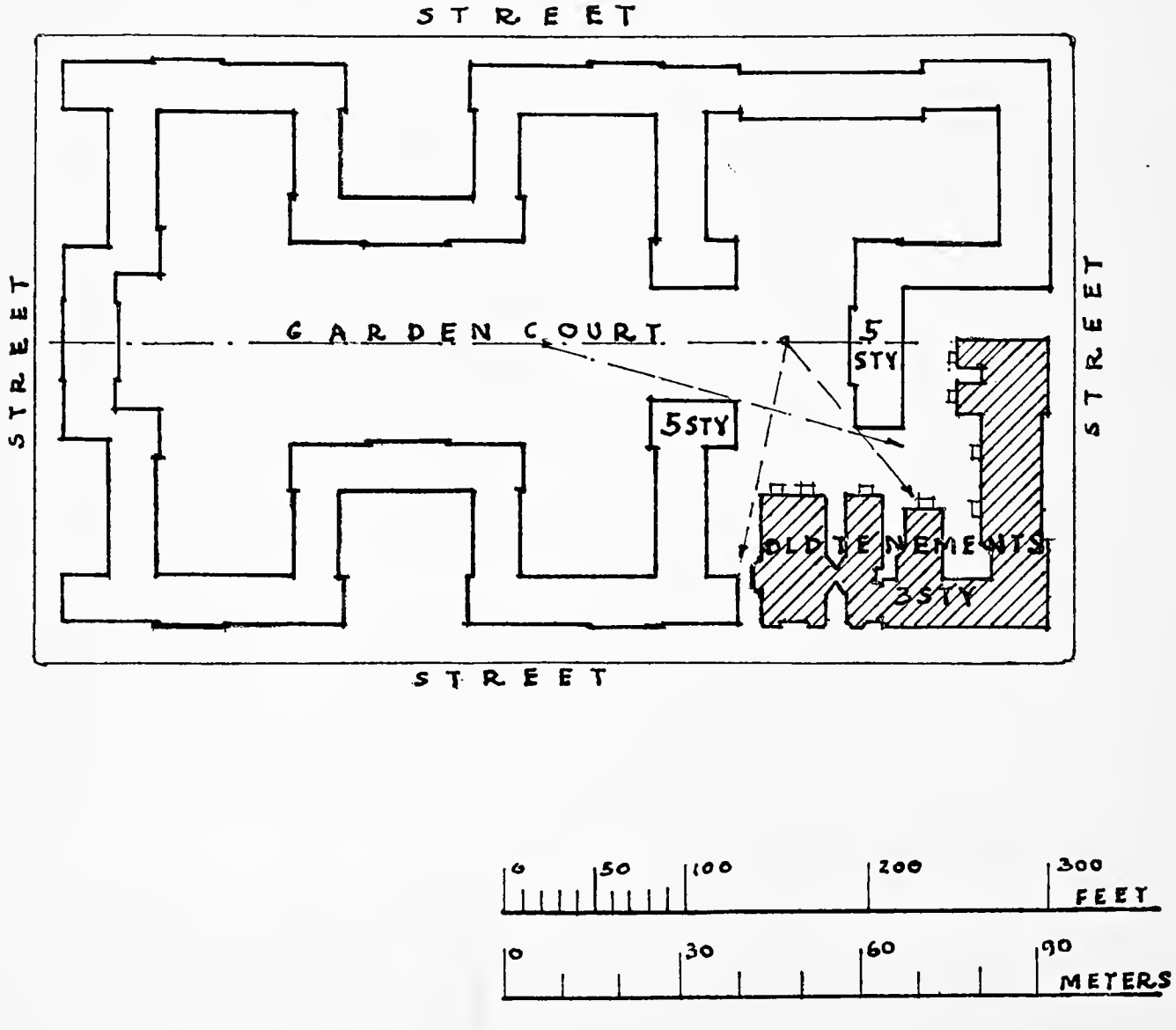
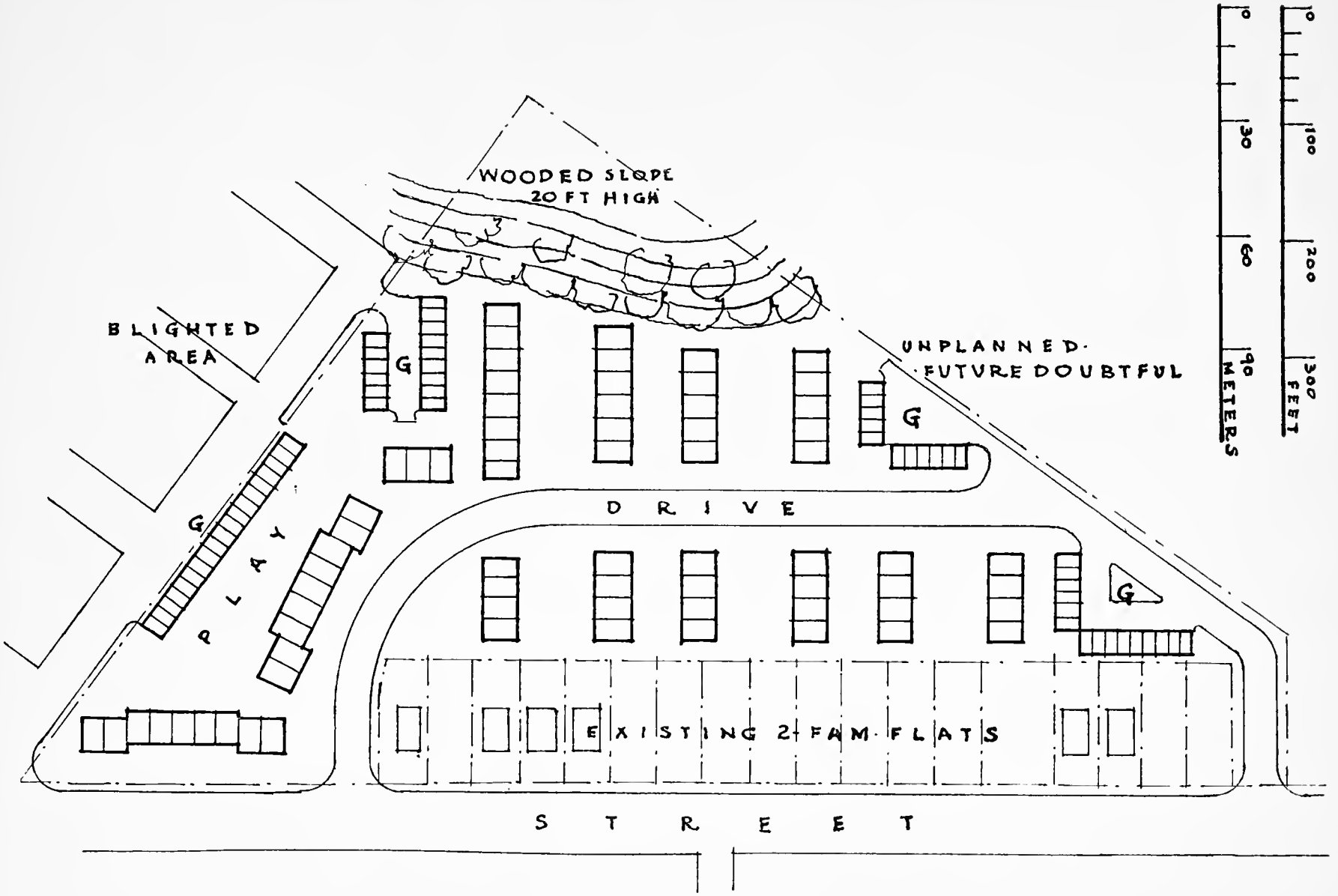


Figure 130 shows the sacrifice of a few units. Here the new buildings are arranged so that only a few rooms will look toward the unsightly back yards of the old tenements which could not be demolished. In Figure 131 the ends of the buildings and the garages face the bad views; the site has poor outlooks in almost every direction.

Figure 130 (below). Block plan to hide an eyesore. Michigan Boulevard Gardens, Chicago, Illinois. Eugene Henry Klaber and Ernest A. Grunsfeld, Jr., architects; Henry Wright, consultant. *Figure 131 (opposite page). Plan for site surrounded by adverse conditions.*




WOODED SLOPE
20 FT HIGH
BLIGHTED
AREA
UNPLANNED·
FUTURE DOUBTFUL
G
G
G
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PLAY
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EXISTING 2-FAM FLATS
STREET
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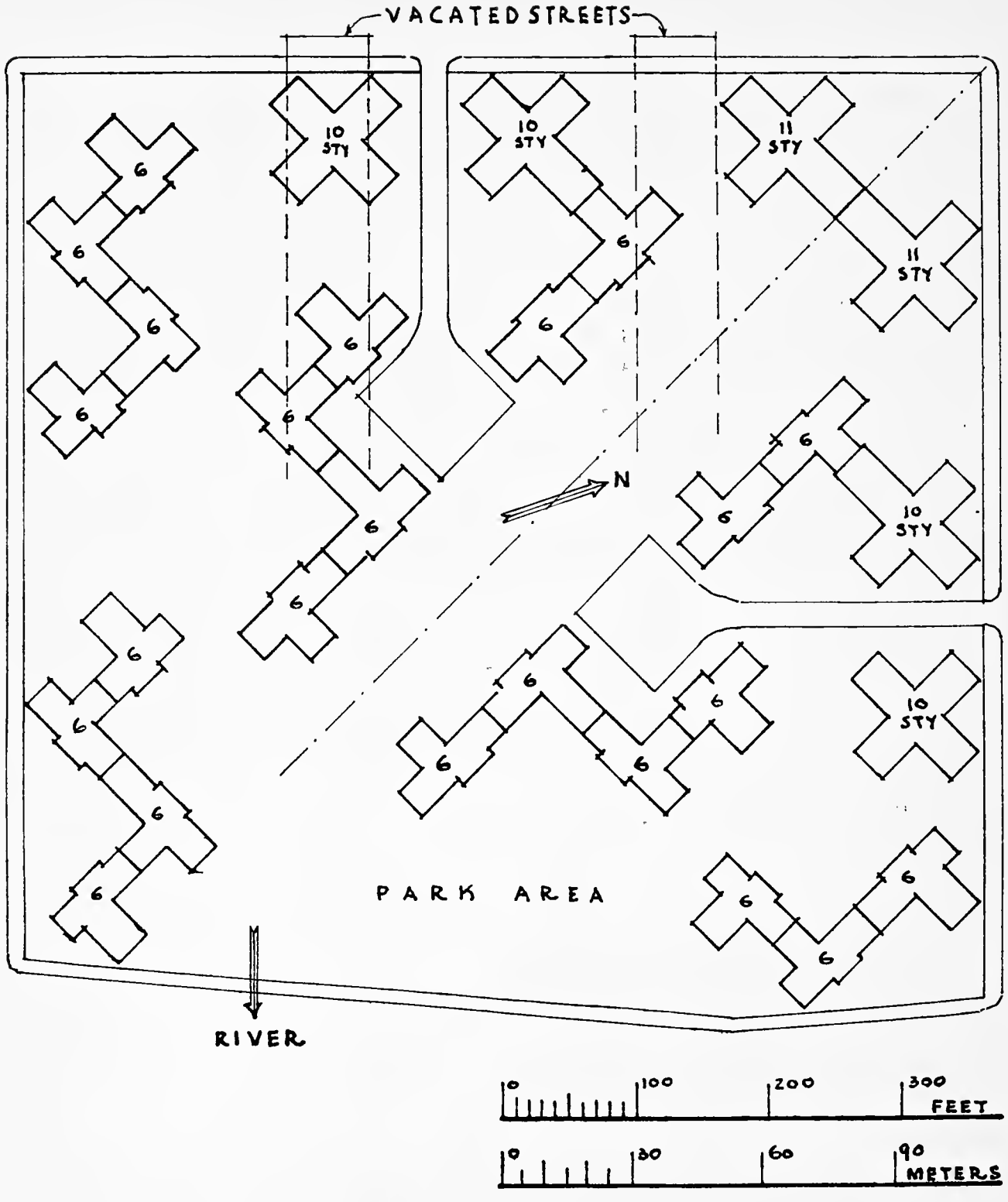
VACATED STREETS
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N
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10 STY
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RIVER
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30
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METERS

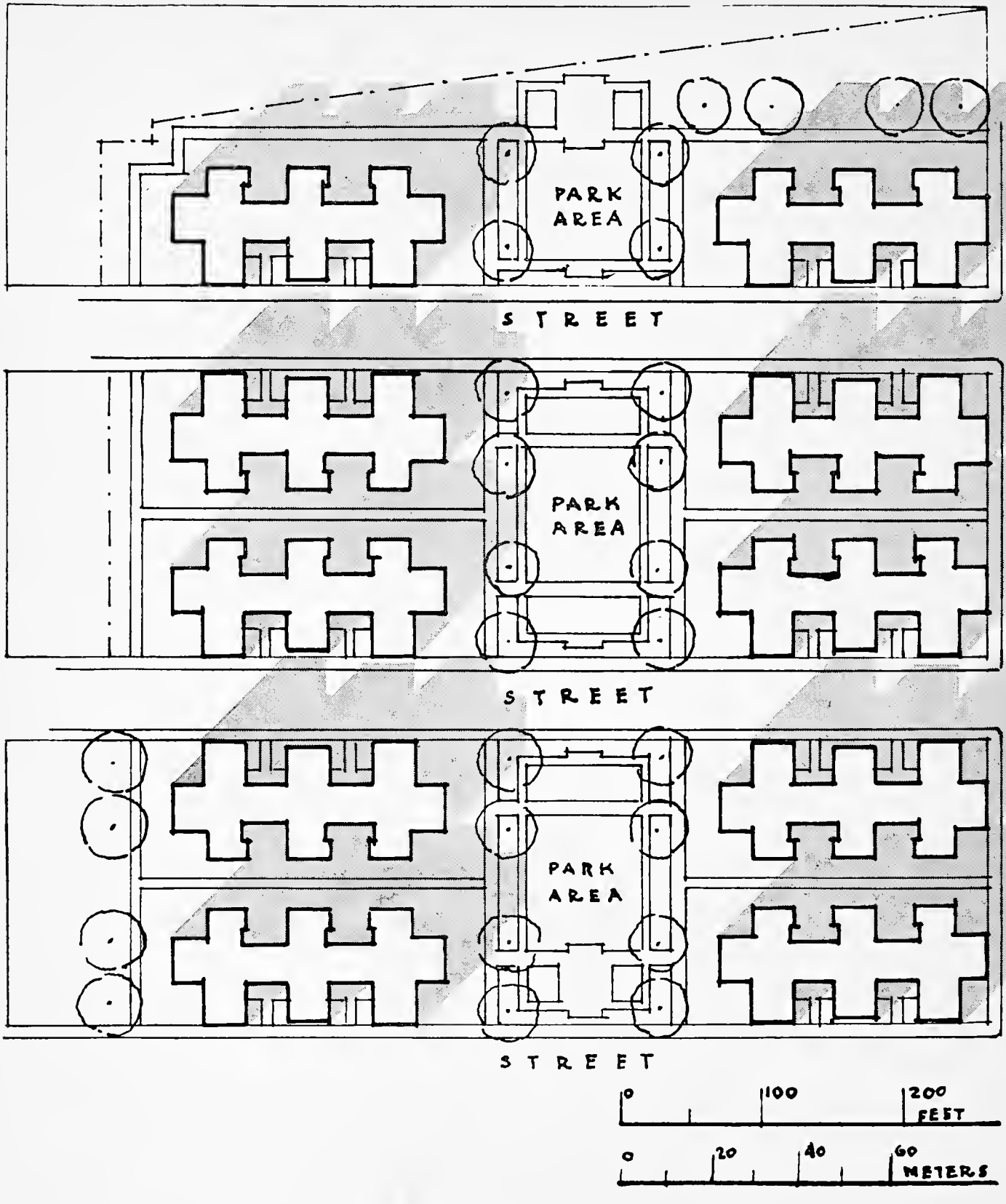
existing street pattern

What can the architect do when a proposed housing site has a previously imposed pattern of long narrow blocks? He may find that pavements, sidewalks and utilities have been installed and that giving his buildings the orientation he would prefer is extremely difficult. In some cases, especially with small sites, he may have no other course open to him than to conform with established building lines and string his buildings along the street frontages. But this is not always the case and he should not follow the easy course of allowing a two dimensional pattern to dominate his scheme, which is three dimensional. Unless he must have a very high coverage, he can usually find ways of arranging his building masses so that at least some of the curse of the street pattern is mitigated.

Of course if intervening streets can be vacated to form a superblock he can go to town. This is very well illustrated by Figure 132. The site enjoys a river view; the direction of the sun at noon coincides almost exactly with the diagonal of the site. These elements are the theme of the site plan. The higher buildings are all toward the north so that they do not overshadow the lower structures.

Even when street vacation is not possible, the architect is not completely stymied. Figures 133 and 134 show two stages of a site layout plan. Both have the same buildings and coverage. In Figure 133 the architects have not as yet freed themselves from the street pattern. Although they have provided generous garden space, only a few apartments can enjoy a view of it, and the buildings are in two dense masses interfering with each other's outlook. In 134 they have rid themselves of the pattern and created their own. The streets are still there, but by simple shifts in the building location, a series of courts two hundred feet square has been created.

Figure 132. Streets vacated to form superblock. Voorhees, Walker, Foley & Smith, architects; C. W. Schlusing and A. E. Poor, associates.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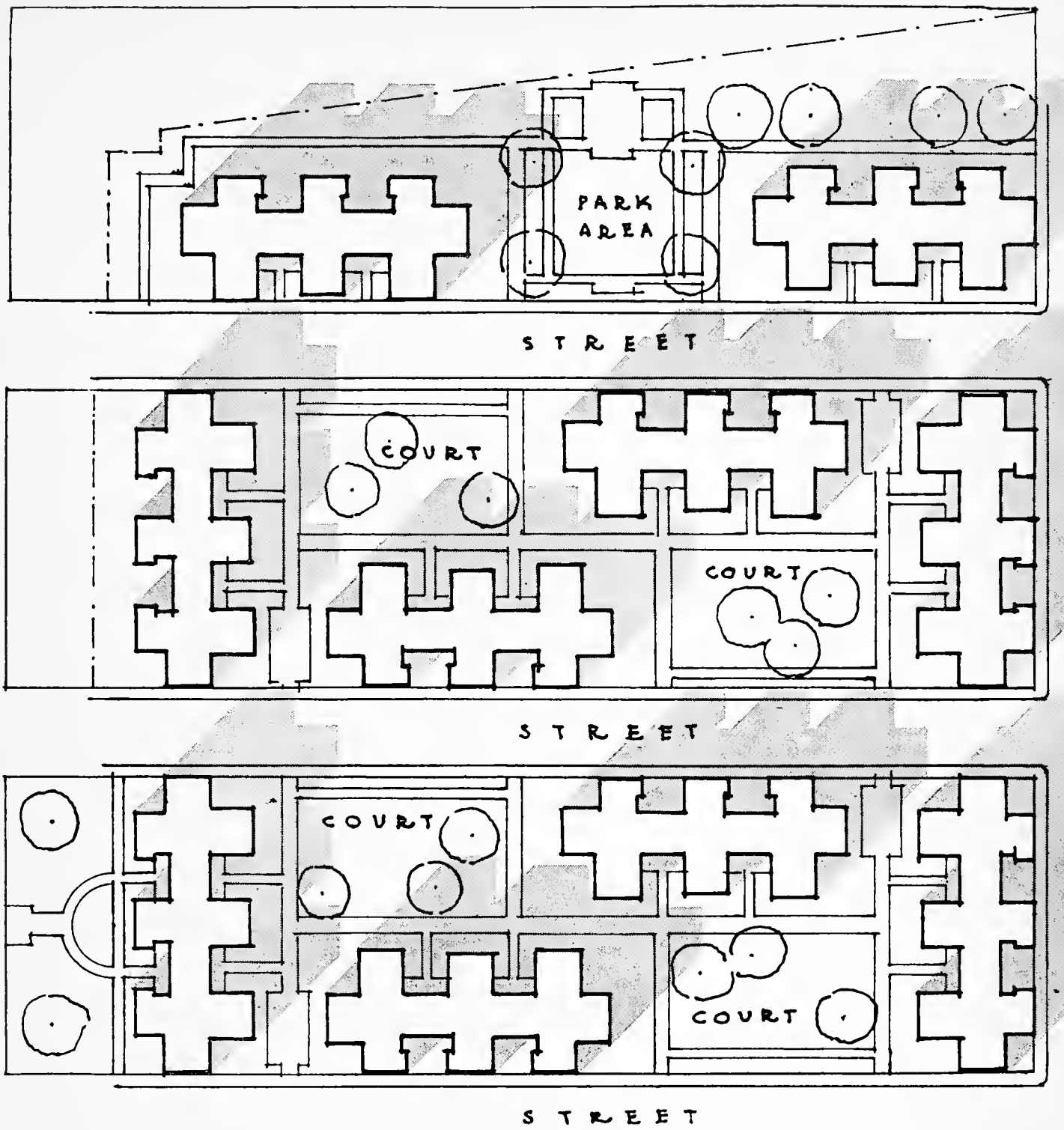


Figure 133 (opposite page). Imposed street pattern. First study of site plan. Figure 134 (above). A later study of site plan. Springsteen & Goldhammer, architects.

Figure 135 is yet another example of breaking through a street pattern. A portion of one street has been vacated, but other than that, the street layout remains unchanged. The buildings are two story row houses; but how different this development from the usual drab result. Of course, let's face it, the principal difference is neither streets nor buildings, but architectural design.

the small lot

Even on comparatively narrow properties there may still be some choice of orientation. Usually the choice is whether rooms shall by preference face the street or the rear of the lot. The decision will be affected by factors such as the following:

1. Is the street noisy or quiet?
2. In which direction is the outlook best?
3. Which exposure has better sunlight?

In Figure 136 there are three apartment plans on lots 75 ft. wide. In each drawing an existing building is assumed at the left and a repeat of the unit plan to the right. In A, two apartments and six principal rooms face front, four apartments and eight rooms have a rear exposure. In B conditions are reversed and only two principal rooms instead of six are at

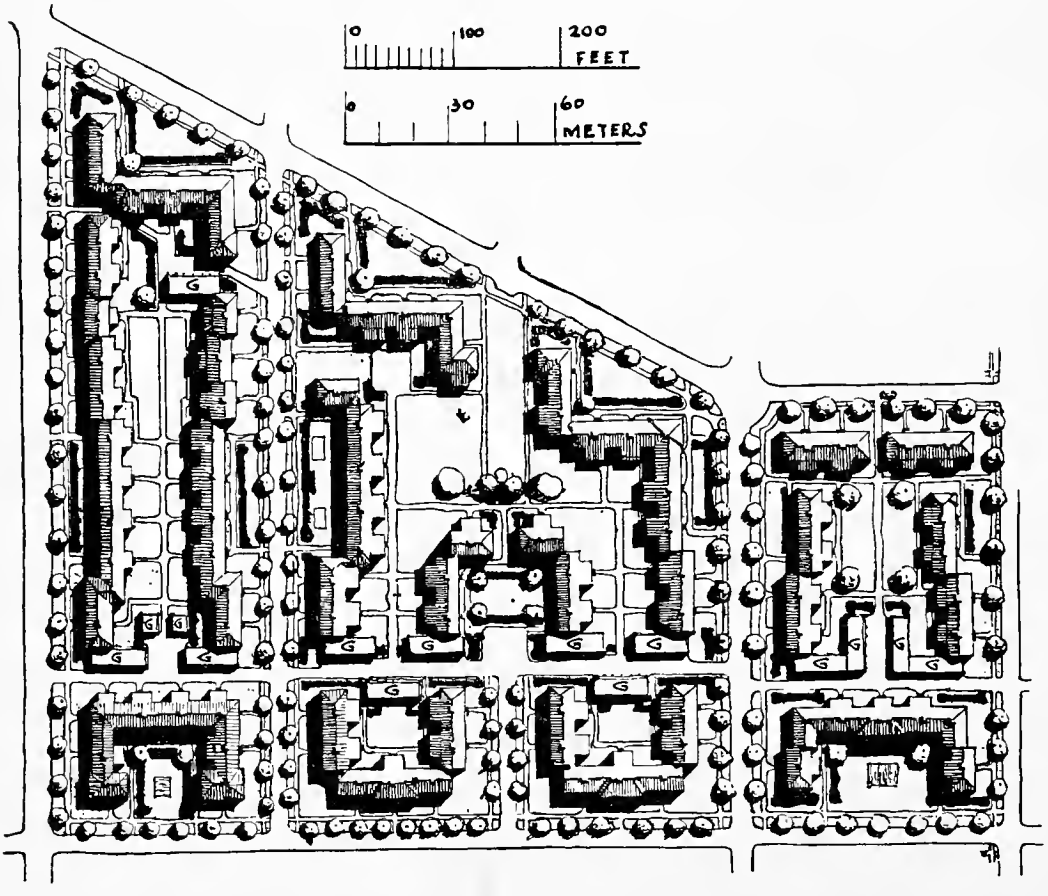


Figure 135. Desirable planning with conventional street pattern. Federal Housing Administration.

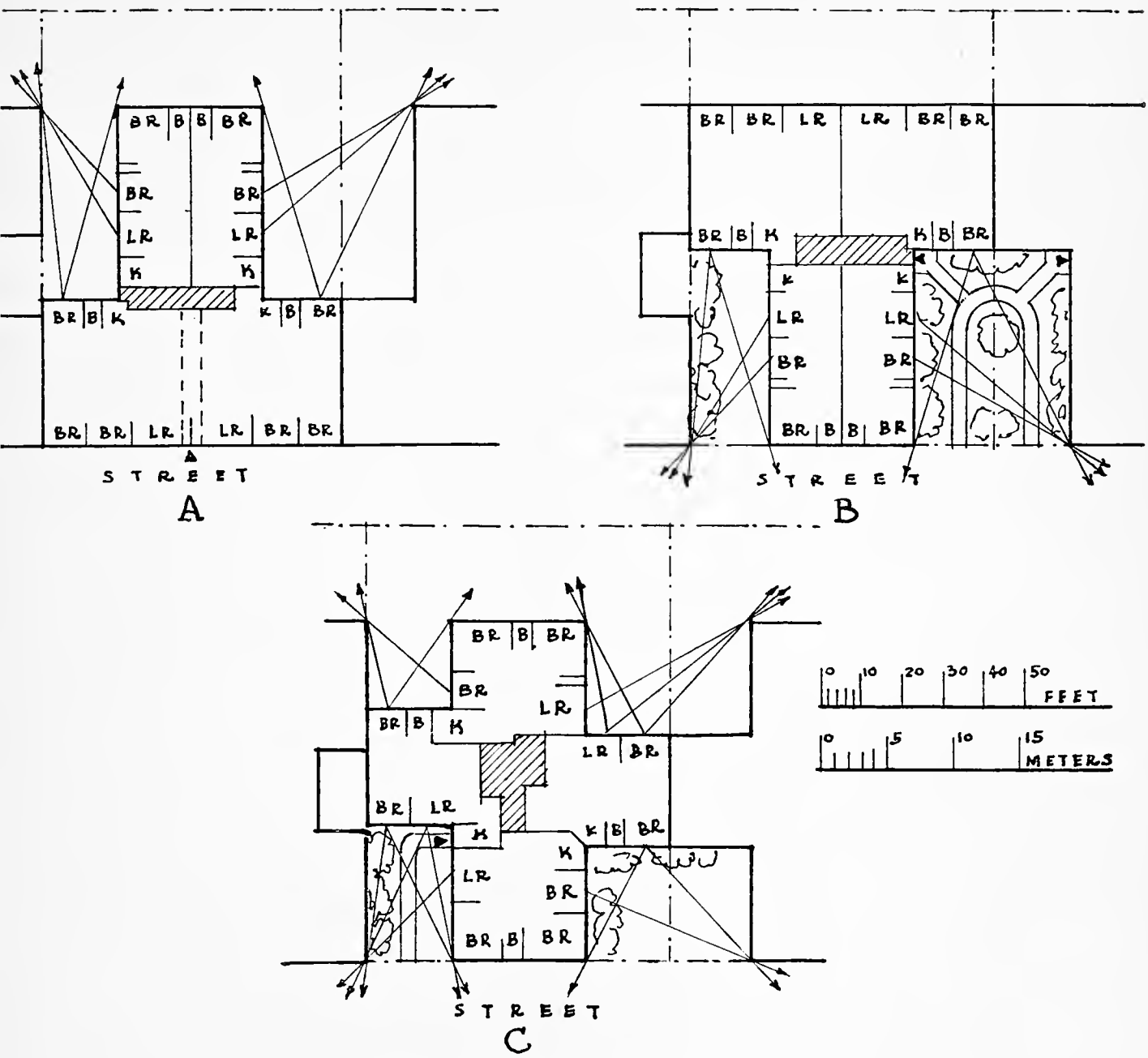


Figure 136. Choice of outlook on a narrow lot.

the building line. In C three apartments and seven principal rooms have exposures in each direction. It will be noted that the angle of vision from rooms facing courts is better in this plan than in either of the others. None of these three plans is a world beater; they are presented merely to show a method of analysis.

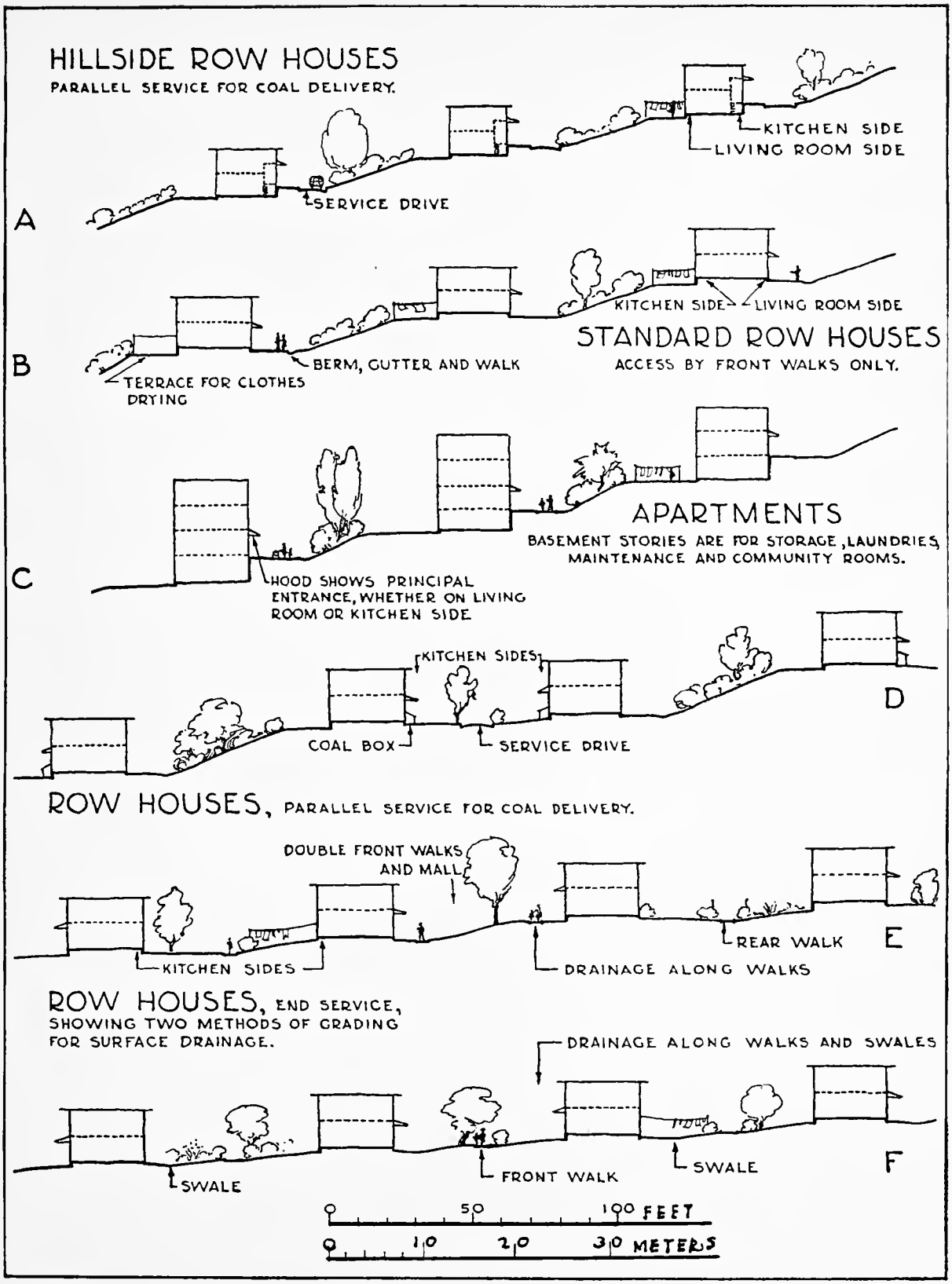
Topography

Figure 137. Relation of buildings to slopes. Federal Public Housing Authority.

On land which is substantially level, the problem of relating buildings to the topography is comparatively simple. They can be placed almost anywhere and grouped as desired with the knowledge that no great difficulty of grading and no excessive foundation depth will arise merely because of conformation of the land; in a word, topography is not a major directive of the planning process. This is not the case on sharply sloping ground. On hilly sites every building must be carefully studied in relation to natural grades to minimize necessary cut and fill and deep foundations, which create no usable space to compensate for their cost. Groups of building units must be designed skillfully so that they are integrated architectural compositions which do not look as though the component units have slipped from their original position and are about to tumble apart.

Whereas we cannot discuss all the manifold topographical problems which may be encountered, there are certain typical situations and solutions which are worthy of comment.

1. One of the commonest methods of handling a steep slope is to place the length of the buildings along the contour lines. This minimizes grading operations and may permit the use of basement dwellings in apartment buildings if the structures act as retaining walls which take up a substantial change in grade. This method is shown in Figure 137. The sections in A illustrate the problems involved and methods of their solution. Figure


HILLSIDE ROW HOUSES
PARALLEL SERVICE FOR COAL DELIVERY.
KITCHEN SIDE
LIVING ROOM SIDE
A
SERVICE DRIVE
KITCHEN SIDE
LIVING ROOM SIDE
STANDARD ROW HOUSES
ACCESS BY FRONT WALKS ONLY.
B
BERM, GUTTER AND WALK
TERRACE FOR CLOTHES DRYING
APARTMENTS
BASEMENT STORIES ARE FOR STORAGE, LAUNDRIES, MAINTENANCE AND COMMUNITY ROOMS.
C
HOOD SHOWS PRINCIPAL ENTRANCE, WHETHER ON LIVING ROOM OR KITCHEN SIDE
KITCHEN SIDES
D
COAL BOX
SERVICE DRIVE
ROW HOUSES, PARALLEL SERVICE FOR COAL DELIVERY.
DOUBLE FRONT WALKS AND MALL
REAR WALK
E
KITCHEN SIDES
DRAINAGE ALONG WALKS
ROW HOUSES, END SERVICE, SHOWING TWO METHODS OF GRADING FOR SURFACE DRAINAGE.
DRAINAGE ALONG WALKS AND SWALES
SWALE
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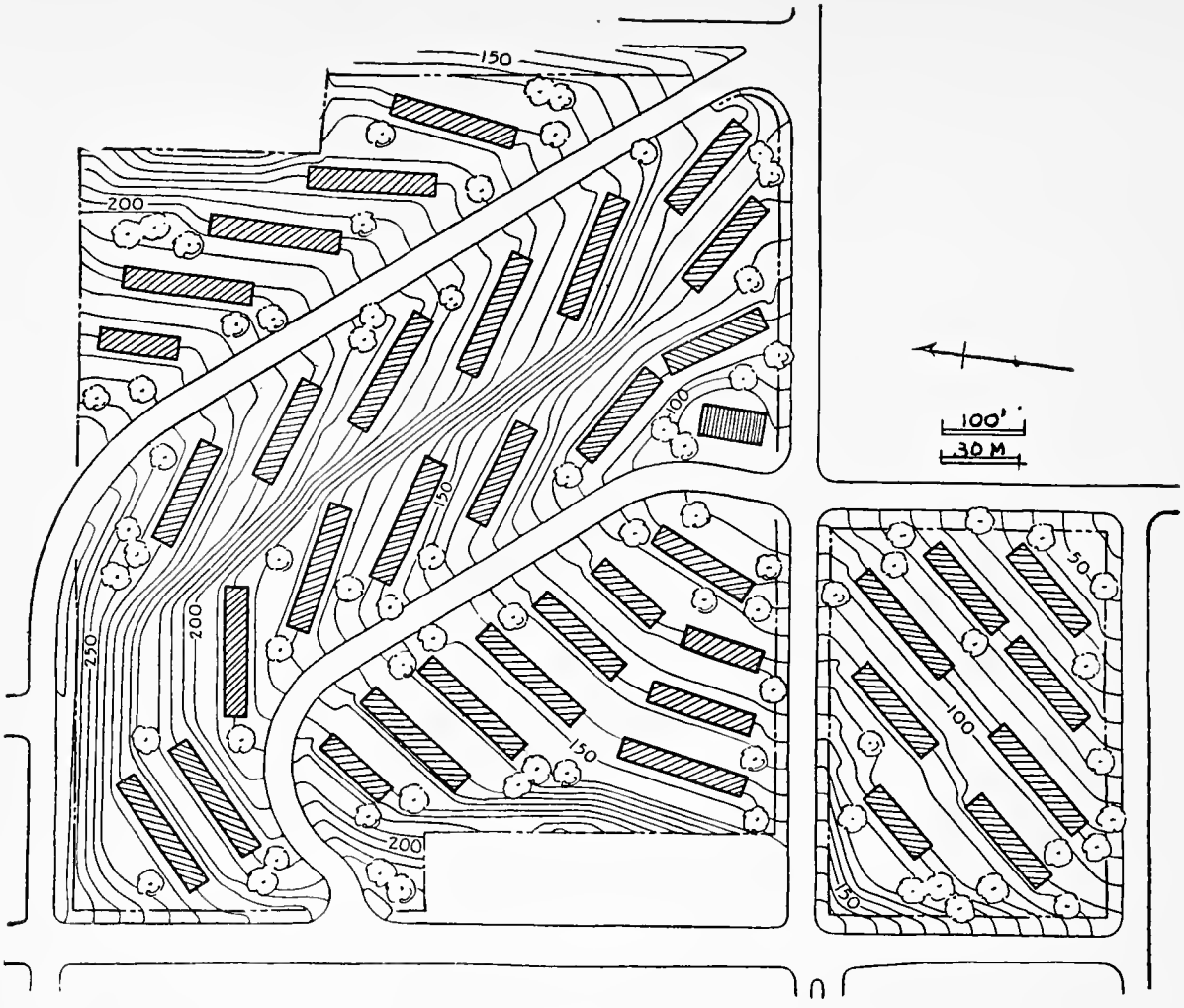


Figure 138. Relation of buildings to contours. Federal Public Housing Authority.

138 shows their application to a large site. The site plan is logical and economical. The appearance of the largest block in this plan is open to question; will or will not the varying angles at which the buildings are set spoil the looks of the group? The answer cannot be assumed, it requires careful perspective study, or better still, a model. Note: models should be studied from a worm's-eye view, not bird's-eye; that is the way the buildings will be viewed. Figure 139 shows a clever handling of topography on a narrow and deep lot. Not only do the buildings follow the contours, but their position avoids facing the lot lines at right angles with only a narrow intervening space.

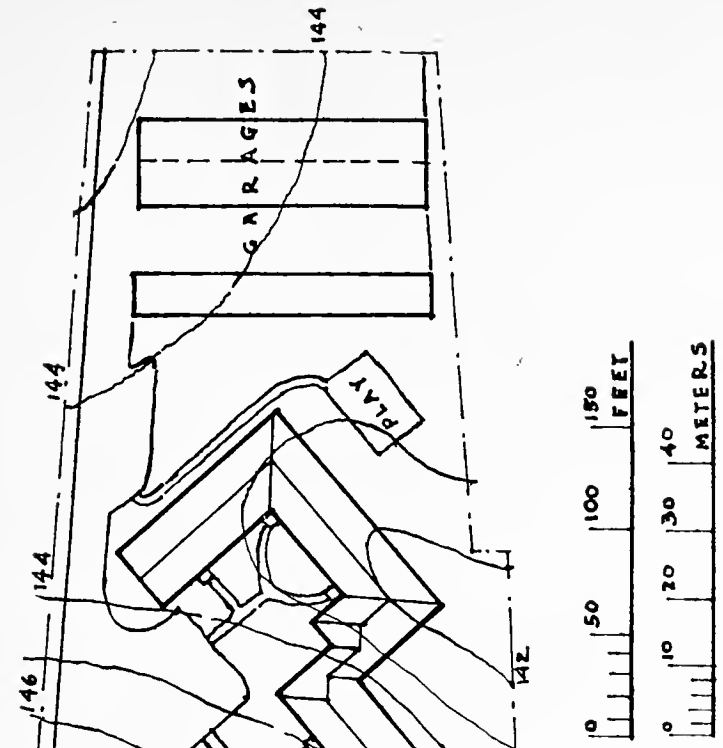


Figure 139. Narrow lot running downhill from street. Federal Housing Authority.

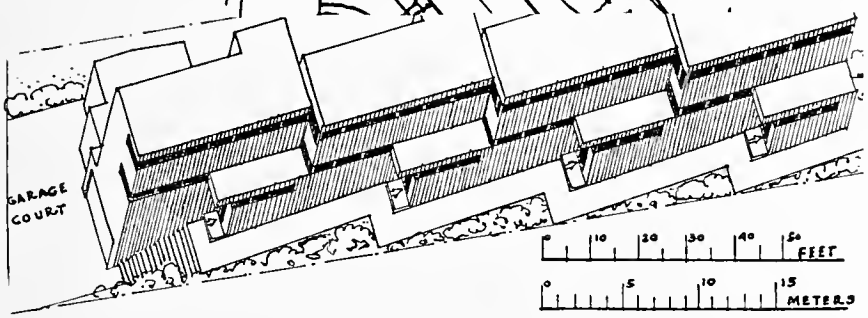


Figure 141. A. Architectural landside. B. Sliding effect obviated. C. Integrated design of repeating units on narrow sloping terrain. Gregory Ain, architect.

2. Buildings running perpendicular to the contour lines on sharp slopes always create problems of design and construction. The longer the run, the greater the problem. Figure 140-A shows what happens when a long building with continuous floor levels is used. The alternative is to step the buildings down with the grade as shown in B. The reduction in grading and foundation expense is evident. If, in stepping down, the window heads of successive building units do not line up, a continuous building wall will present a messy appearance, in which case it may be better to offset the units as shown in C.

How many step-downs can there be without creating the impression of endless monotony? Figure 141-A is an example of what builders have frequently done on sloping terrains—just a string of buttons without beginning or end. B is a solution, none too happy, but at least having the virtue of a measure of variety. The question of tolerable number of repeating motives is one of esthetic judgment. For our money, the limit is four. Even then the elevations must be studied to integrate the successive units into a complete building design. This has been done with great skill in the building shown in C. On a narrow and steep lot, the architect had no choice but to use four successive units stepping down hill. The study of the relation of each unit to its neighbors is admirable.

Figure 138. Relation of buildings to contours. Federal Public Housing Authority.

138 shows their application to a large site. The site plan is logical and economical. The appearance of the largest block in this plan is open to question; will or will not the varying angles at which the buildings are set spoil the looks of the group? The answer cannot be assumed, it requires careful perspective study, or better still, a model. Note: models should be studied from a worm's-eye view, not bird's-eye; that is the way the buildings will be viewed. Figure 139 shows a clever handling of topography on a narrow and deep lot. Not only do the buildings follow the contours, but their position avoids facing the lot lines at right angles with only a narrow intervening space.

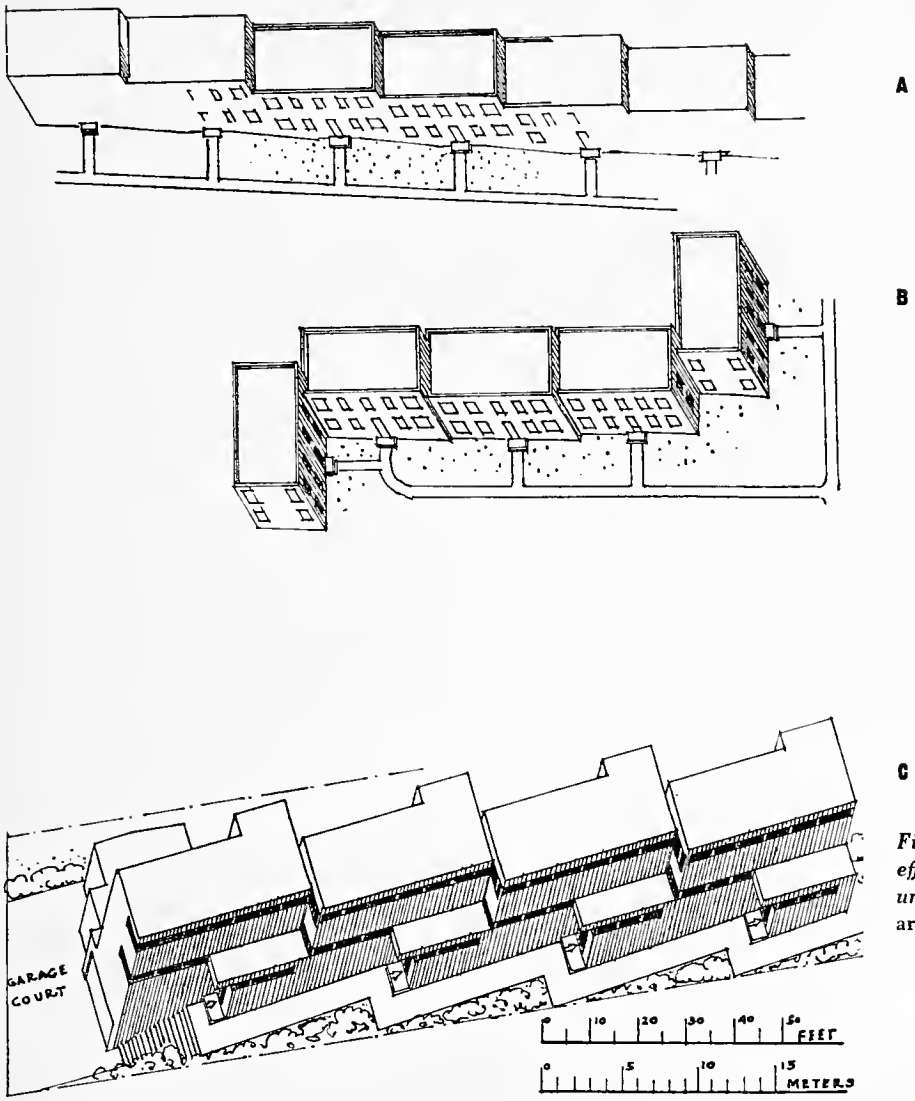
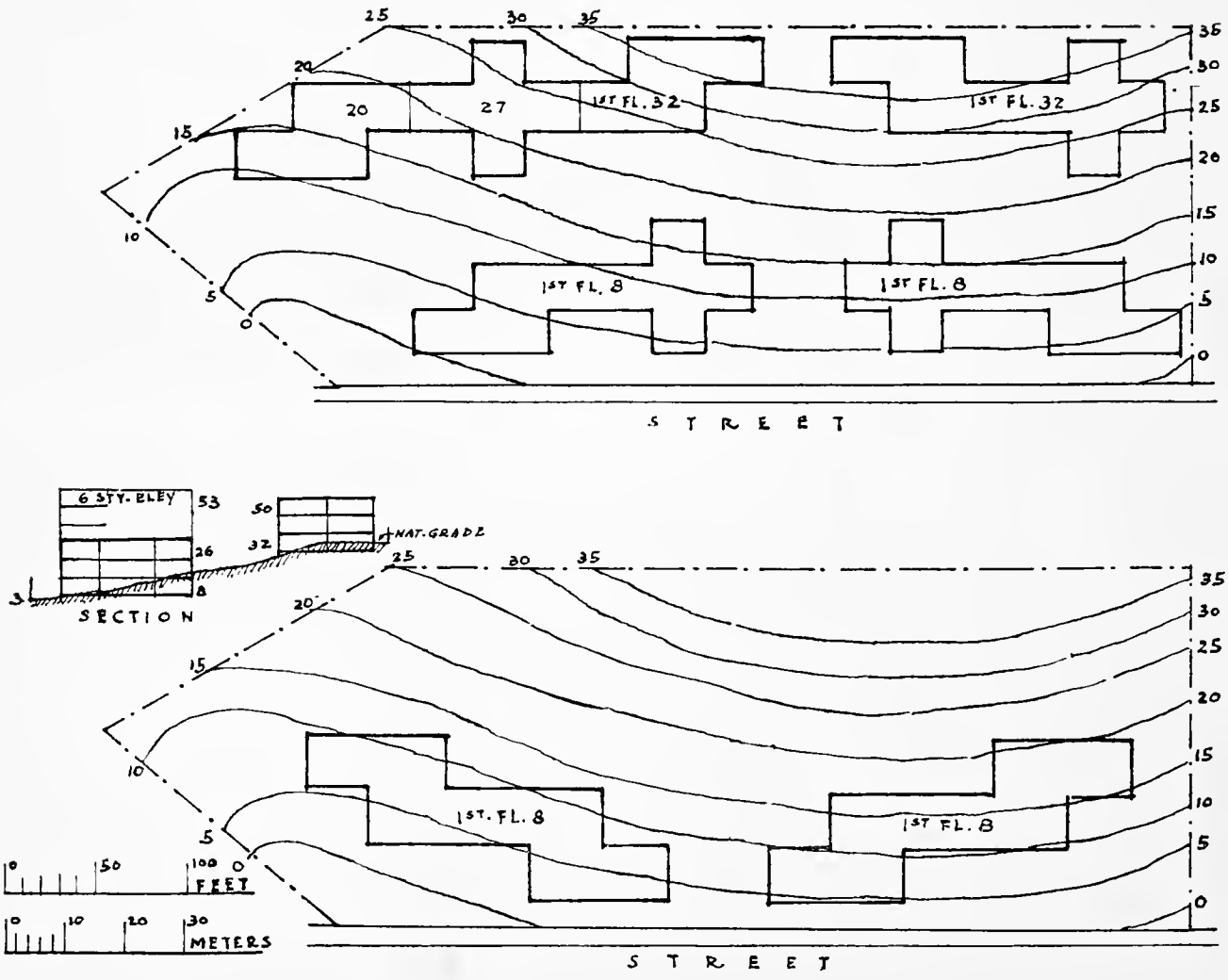


Figure 141. A. Architectural landside. B. Sliding effect obviated. C. Integrated design of repeating units on narrow sloping terrain. Gregory Ain, architect.

3. On small sites, especially if comparatively shallow, a steep slope may preclude the successful development of the property with walk-up buildings. One example is shown in Figure 142. The upper diagram shows three story walk-up buildings. Obviously, those at the top of the slope could be built, but a glance at the section will show that occupants of the top floor will have to climb the equivalent of five flights of stairs. Granted the necessity of the number of dwelling units shown, the only feasible solution is to build an elevator structure of equivalent capacity on the comparatively level land at the bottom.

Figure 142. Site too shallow and steep for walk-up buildings.



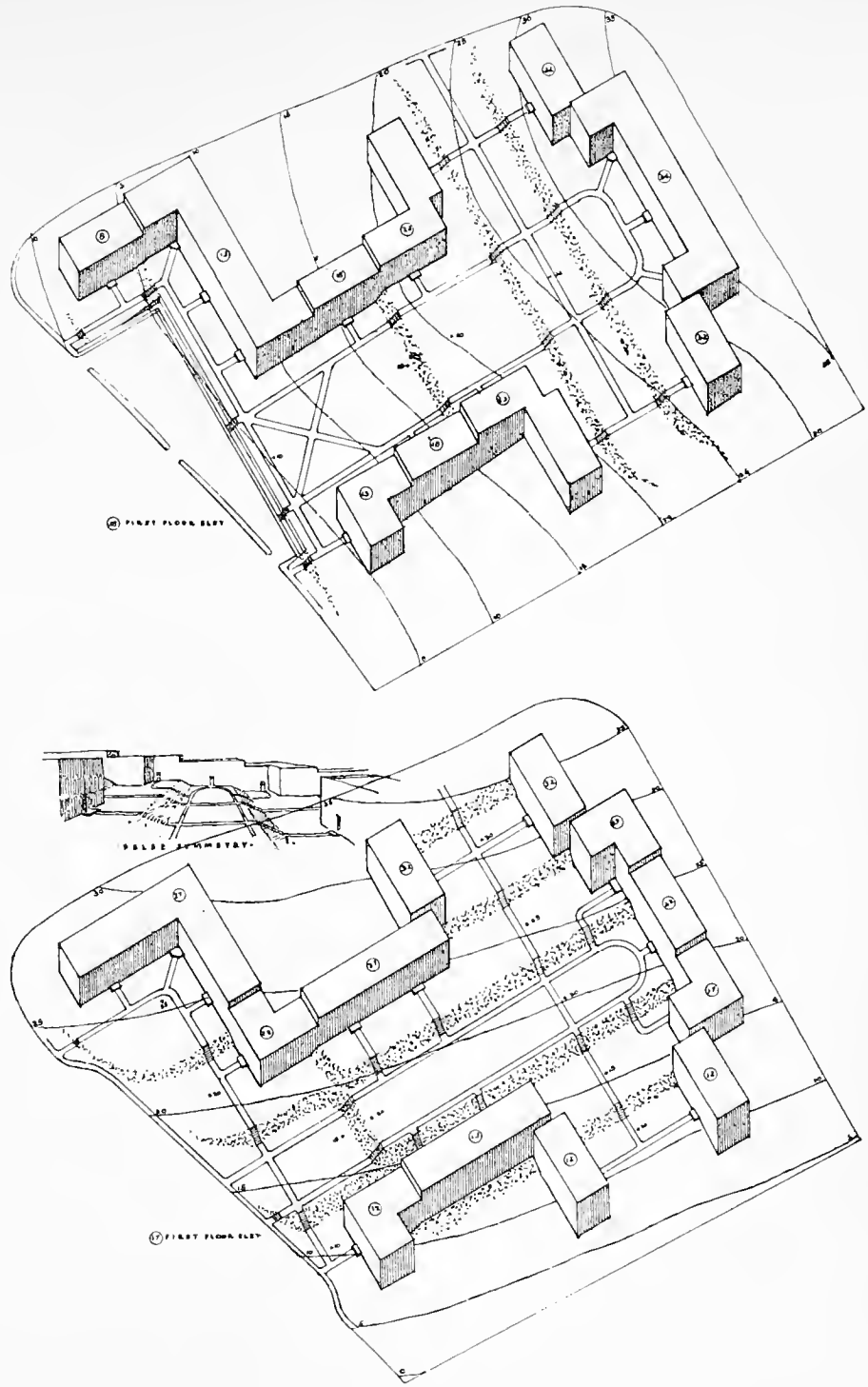


Figure 143. A. Symmetrical layout on sloping land when the axis of symmetry is perpendicular to contours. B. Axis of symmetry parallel to contours.

4. If a symmetrical grouping of buildings is desired on sloping land, the axis of symmetry should be perpendicular to the contours. If parallel, the effect of symmetry is completely lost and the group appears to have one foot in the grave. In addition, the problems of grading are more complex; high retaining walls are often needed. See Figure 143.

5. Where ravines cross a site, no attempt should be made to build on them. They afford excellent drainage and, especially if wooded, are an element of beauty which should be carefully preserved. See Figure 144.

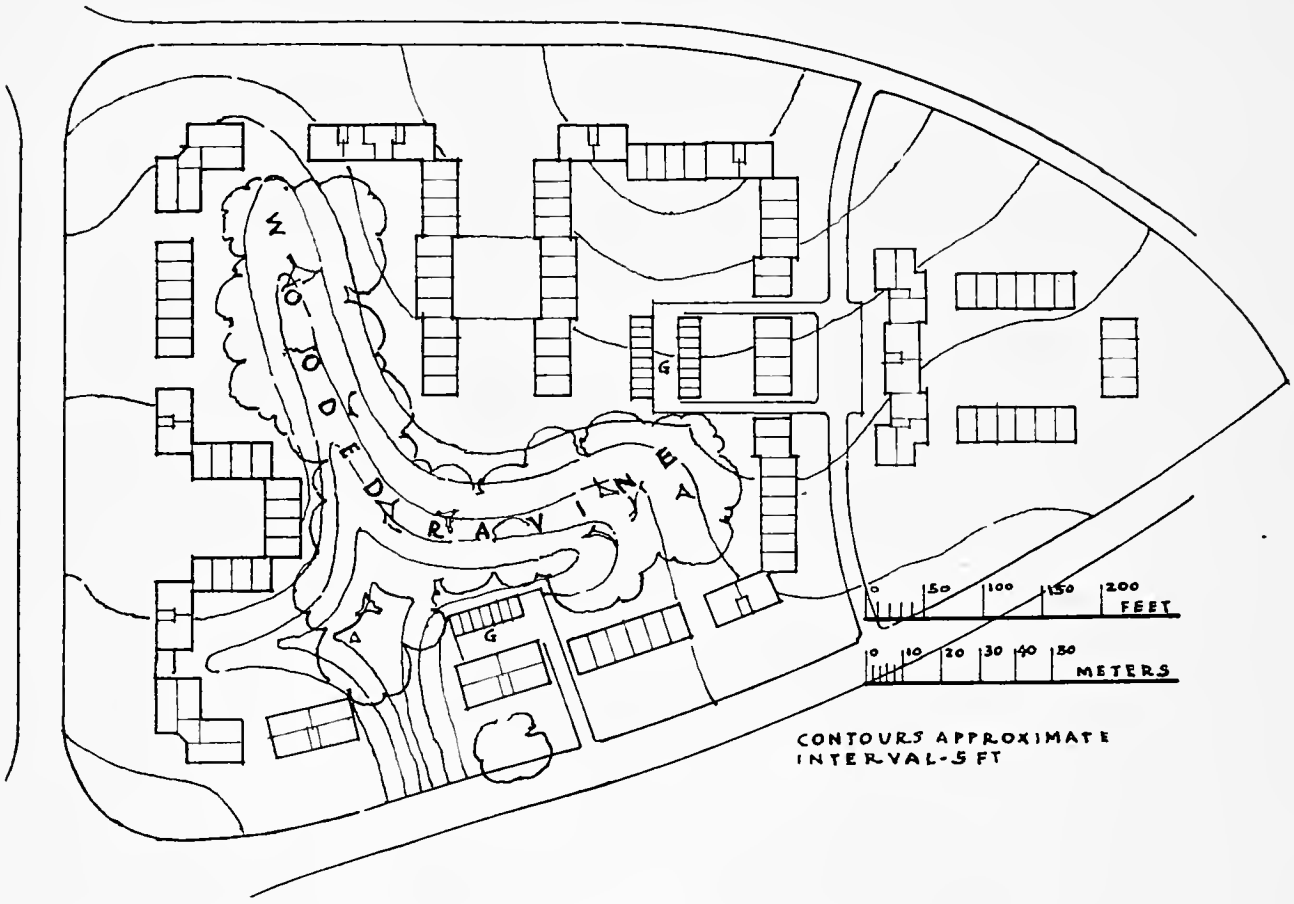


Figure 144. Preservation of wooded ravine. Falkland Properties, Silver Spring, Maryland. Louis Justement, architect.

Coverage and Density

"Coverage" is the term used to express the percentage of a piece of property which may properly be occupied by buildings. "Density" refers to the number of persons or families that may be housed on the premises. There seems to be an erroneous notion that the two terms arise out of common considerations. The control of maximum coverage and of maximum density are both necessary, but the reasons for controls are quite different and as a consequence the methods of effectuating them should have different bases.

The purpose of coverage regulations is to assure adequate light, air, open space, and privacy for the occupants of buildings of varying bulk and height. Hence high buildings should be more restricted than low ones. The building itself and the physical attributes of its immediate surroundings are the determinants of regulatory measures. On the other hand, the causes which prompt regulation of density are social, rather than physical; they are quite independent of the type of building used on a specific site but express a density of population that is considered appropriate to a neighborhood, zone, or area of a community.

We have, therefore, two types of controls, each with its specific objectives and required regulations, one expressed in terms of buildings, the other in terms of people. If we keep this distinction in mind, much confusion of thinking will be avoided. It will be seen that, though different, the two regulatory mechanisms are supplementary and not conflicting.

coverage

The motives of coverage regulation require that if high buildings are erected on a given site, the percentage of coverage be less than for lower structures. How to determine the progressive diminution of the building area is a hard nut to crack. The average regulatory code is a compromise, inclined not to be too hard on the high building. Frequently the light and ventilation on the lower floors are entirely inadequate as a result, witness the court and yard exposures of so many urban apartment buildings.

The adequacy of coverage regulations depends in a large measure on the plan of the proposed building and the shape of the lot. In Figure 145 the two buildings shown are equal in area on lots of equivalent size, but the plan to the right is unquestionably preferable. It will be evident therefore that coverage is not the sole criterion of desirability. Its regulation must be supplemented by controls of court size, a clumsy method at best, especially where these two factors are controlled respectively by a zoning ordinance and a building code.

For legal purposes some generally applicable measure must be established. For this purpose the American Public Health Association has suggested the following permissive coverages for dwellings:*

1-family detached	30%
1-family semi-detached or 2-family detached	30%
1-family row or 2-family semi-detached	30%
2-story multi-family	30%
3-story multi-family	30%
6-story multi-family	25%
9-story multi-family	20%
13-story multi-family	17%

These are percentages of the net residential land.

Here arises the question whether coverage should be based on net or gross area, the latter being the area within the property lines plus half the width of abutting streets, which are assured open spaces protecting light and air on the property. If gross area is the base, it would permit excessive building area on small corner lots or perhaps unduly restrict properties with only one street frontage. If the base is net area the property having more than one frontage is at a disadvantage. This is illustrated in Figure 146. If a 30% coverage is based on net area, property B has no advantage in its corner location; if on gross area, B will be 50% larger than A. With a large site surrounded by streets, C, the difference between the resultant building areas is not so marked ($6\frac{1}{2}\%$). On the whole, it seems better to use net area as a criterion, with perhaps a 5% to 10% increase for properties with more than one frontage. If interior streets are created on large properties, their area should be deducted from the property area to determine the net, since there is usually no assurance that the property may not be subdivided at some future time. In any event coverage regulations should contain a provision that no property approved under them may be subdivided unless the newly created pieces conform.

The inherent difficulty with all these regulations is that they are based on land and not on buildings. After all, the fundamental considera-

**Planning the Neighborhood*, Public Administration Service, Chicago, 1948.

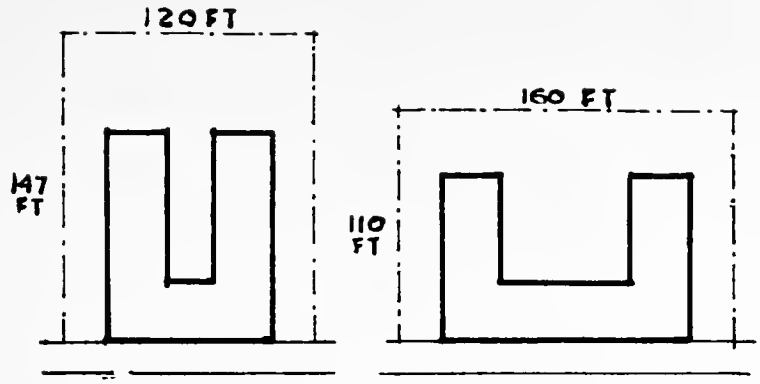
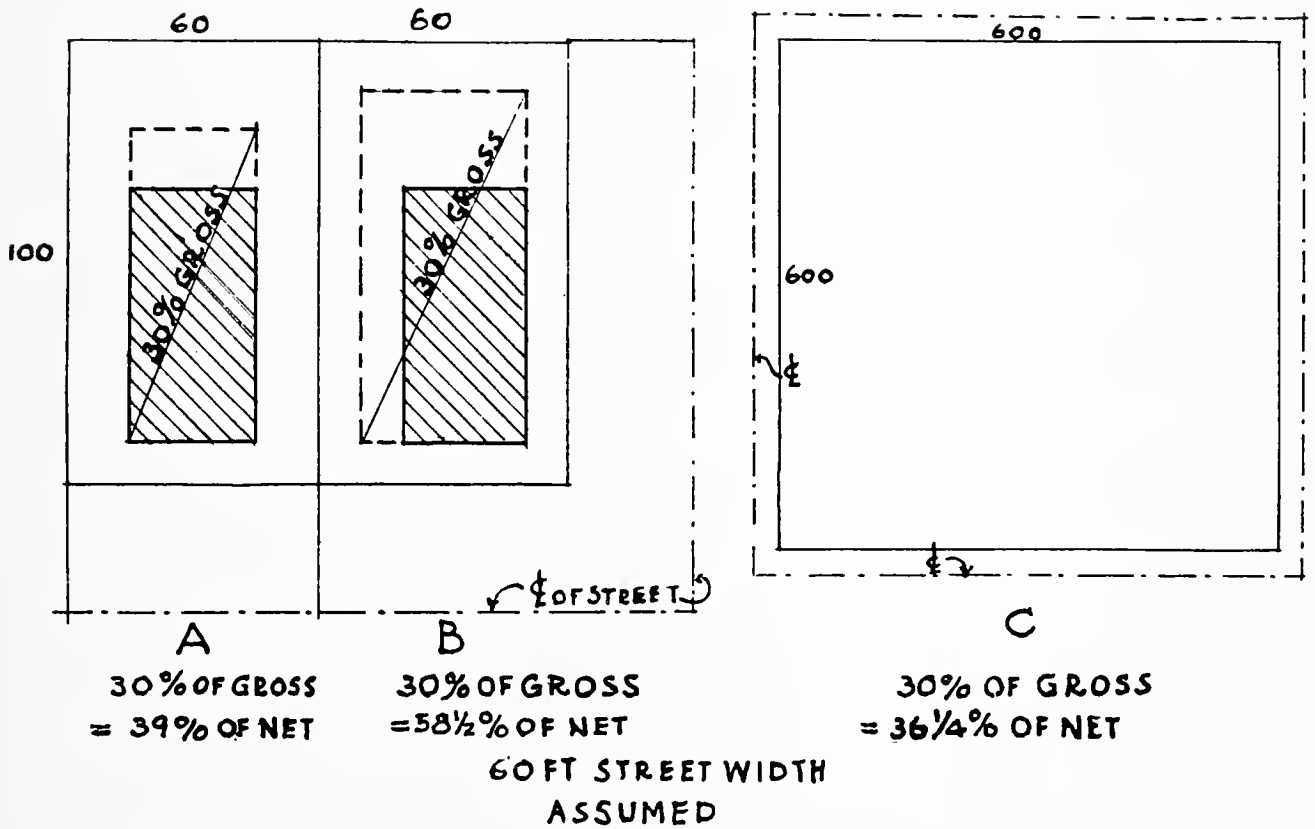


Figure 145 (above). Equal coverage with varying court widths. Figure 146 (below). Coverage based on net and gross areas.



tion for residential buildings is how much light and air is enjoyed by the occupants of the lowest habitable floor.

The following suggestion would probably present serious administrative difficulties but may be a clue to a more rational approach. It makes the following assumptions:

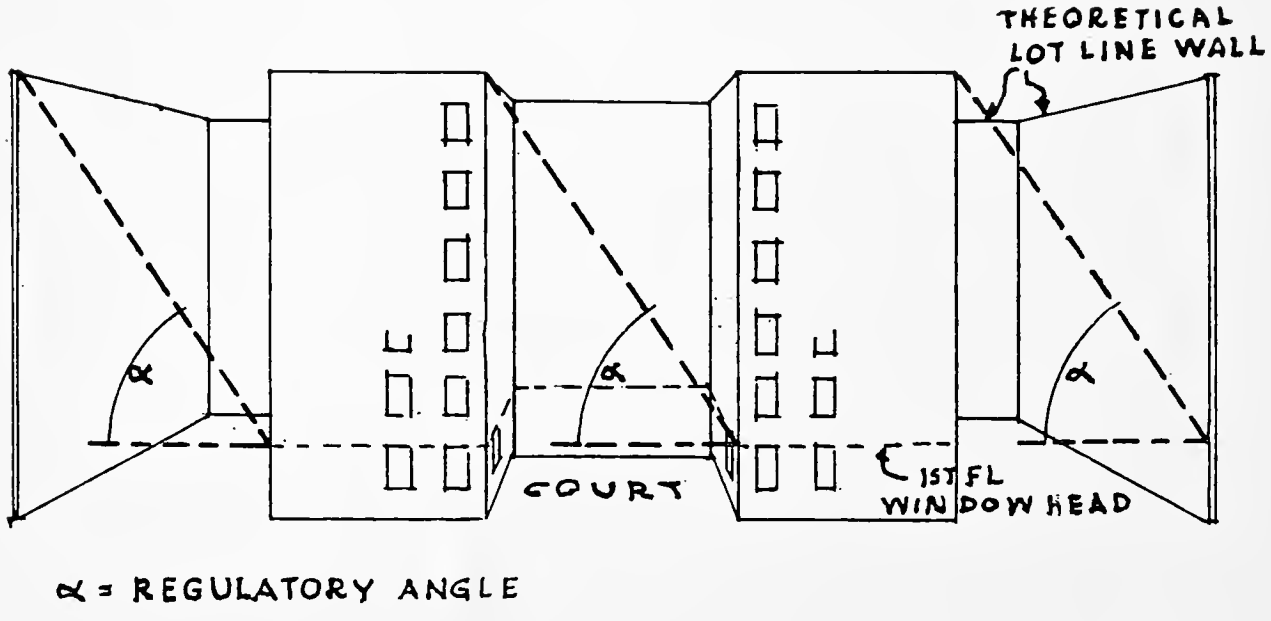
1. A theoretical wall along the side and rear property lines of the maximum building height allowable in the area.

2. A maximum angle at which light can pass a window head and yet afford adequate light within a room.

3. A requirement that a line between the lowest window head of a living room or bedroom and the top of the opposite wall of a court or the theoretical wall, in a vertical plane at right angles to the window wall shall not form a greater angle with the horizontal than that prescribed. See Figure 147. This regulation could also determine the spacing of separate buildings on the same property.

Whatever its faults, such a regulation would place a premium on larger developments and would restrict buildings on narrow lots to two

Figure 147. Regulation of court size and coverage by angle of light.



rooms in depth. It has the further advantage of being based directly on the need which motivates regulation.

density The elements which determine coverage regulations are related to the individual property and the building to be erected on it. Density standards arise from consideration of community-wide factors as expressed in the city plan, if there is one. They require study of the following:

1. Planned distribution of the total population.
2. Public utilities and their present or programmed capacity.
3. Municipal services: waste removal, fire and police protection.
4. Capacity of transit media to places of employment.
5. Availability of recreational facilities.
6. Probable number of children and school capacity.
7. Adequate open space for probable use by tenants or owners.

The last item is of great importance, and for this reason, if for no other, density requirements should be based on the net area of residential land, since streets and driveways add little to outdoor living.

The American Public Health Association* has recommended the following densities, by type of dwelling and number of dwelling units per net acre:

Dwelling Type	Desirable	Maximum
1-family detached	5	7
1-family semi-detached or 2-family detached	10	12
1-family row or 2-family semi-detached	16	19
2-story multi-family	25	30
3-story multi-family	40	45
6-story multi-family	65	75
9-story multi-family	75	85
13-story multi-family	85	95

On the basis of these values they give an example of a possible composition of a neighborhood of 1375 families with diversified dwelling types.

	Dwelling Units		
Dwelling Type	Percent	Number	Total Acres
1-family row	26%	357	30.3
2-story apartments	26	357	22.9
13-story apartments	48	661	21.2
TOTALS	100%	1375	74.4

The over all average is 18½ families per acre.

In the writer's opinion both of these tables put the cart before the horse. The horse is the density regulation for a given area. Once it is established, it should govern the number of dwelling units permitted either for

Opus cit.

one type of building or for any combination of types that may appear to be needed. If the area density is ten families per acre and a developer wishes to build a 15-story building with 150 dwelling units, he would be obliged to acquire a property of 15 acres. This is preferable to permitting a density of 33 families per acre for high buildings in an area where the average is 18½ families per acre, as in the last table, the more so if future subdivision of the property is possible, in which case there would be pressure to increase the permissive density on all parcels to the highest which has been allowed on any one parcel. Density regulation by zones, as shown in Figure 148, appears to be the simplest method of regulation. The problem of subdivision could be handled by a provision that any parcel created by subdivision must conform with the established area density.

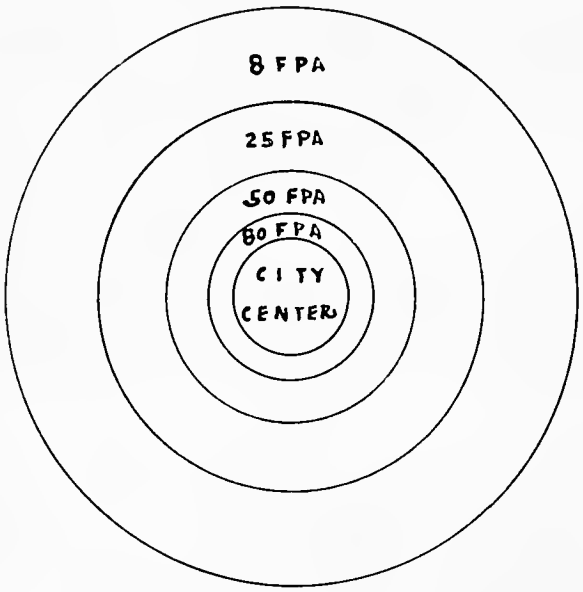


Figure 148. Successive density zones.

Site Planning Methods

In the three previous chapters we have considered important factors which affect site planning. In the interest of simplicity, we shall assume here that they have been studied and shall, for the most part, deal with the planning of the site as though it were flat. Given a chosen terrain, how should buildings and open space be distributed? In our approach to the problem the following should be borne in mind:

1. In projects of single-family homes, row houses, or semi-detached houses, the unit of planning is not the building but the house plus a predetermined area of private land attributed to it.

2. In all cases the open space should be distributed so as to afford the maximum of light and privacy to each dwelling.

3. Where land is subdivided into individual properties, advantage should be taken of the depth as well as the frontage of the lots.

4. Even a good subdivision can be ruined if it merely establishes a single front set-back line, side and rear setbacks, and otherwise ignores the interrelation of houses, their layout and design.

In large projects:

5. Exploit existing boundary streets and utilities to the maximum.

6. Eliminate needless existing streets and plan only such new streets and drives as are essential. This requires study.

7. Plan any necessary interior streets and drives to slow down the speed of traffic.

8. Determine whether the project should be an "introvert" or an "extrovert." As used here, the former term means a project in which the garden elements and principal outlooks from the dwellings are toward the interior of the property and the service elements toward the perimeter; the latter type of project reverses this arrangement. Depending on surrounding conditions, either type is justfiable. Radburn is perhaps the best known

example of introversion. Another is presented in Figure 149. The converse method of planning is shown on Figure 150.

9. Avoid the monotony of too many parallel buildings.

10. Avoid buildings too long for the site; they militate against economical layouts.

11. Housing projects should not be laid out like a college campus. Groupings of buildings should give the occupant a feeling of intimacy that is associated with the idea of home. Monumentality is out of place.

12. Buildings require recurrent services, and every group plan should be studied to make the problems of management as simple as possible and to reduce delivery and removal routes to a minimum.

13. Parking and garage areas should be near the units they serve; walking 400 feet with an armful of groceries is no fun.

size and shape of lots

The largest share of our inventory of housing consists of one-family houses on individual lots. In the past, the subdivision of land for residential use has followed a consistent pattern; rectangular lots with side lines perpendicular to a street. If a subdivision was planned for occupancy by people of means, the lots were sufficiently wide to afford a modicum of privacy for

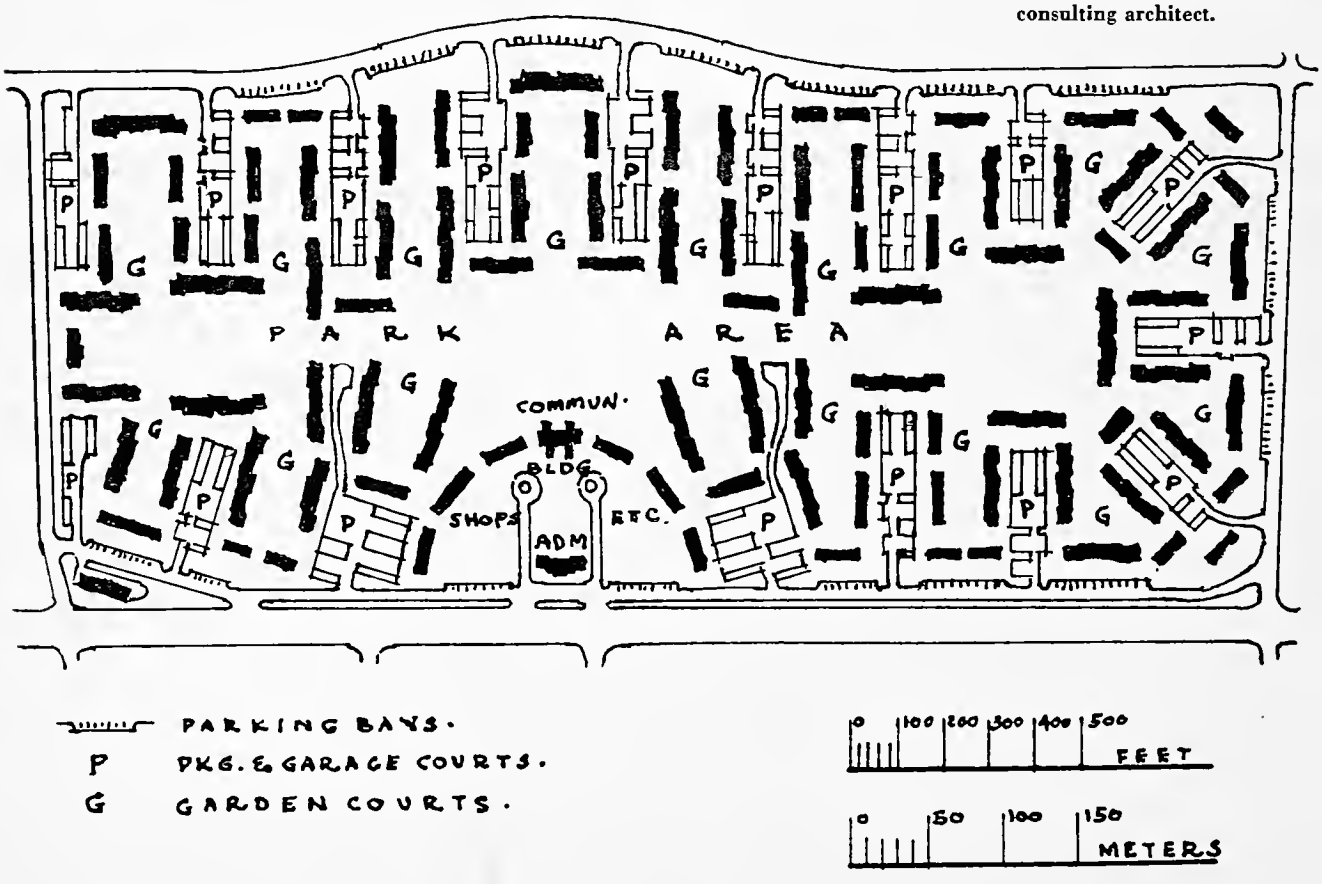


Figure 149. An "introvert" project. Baldwin Hills Village, Los Angeles, California. Reginald D. Johnson and Wilson, Merrill & Alexander, architects; Clarence S. Stein, consulting architect.

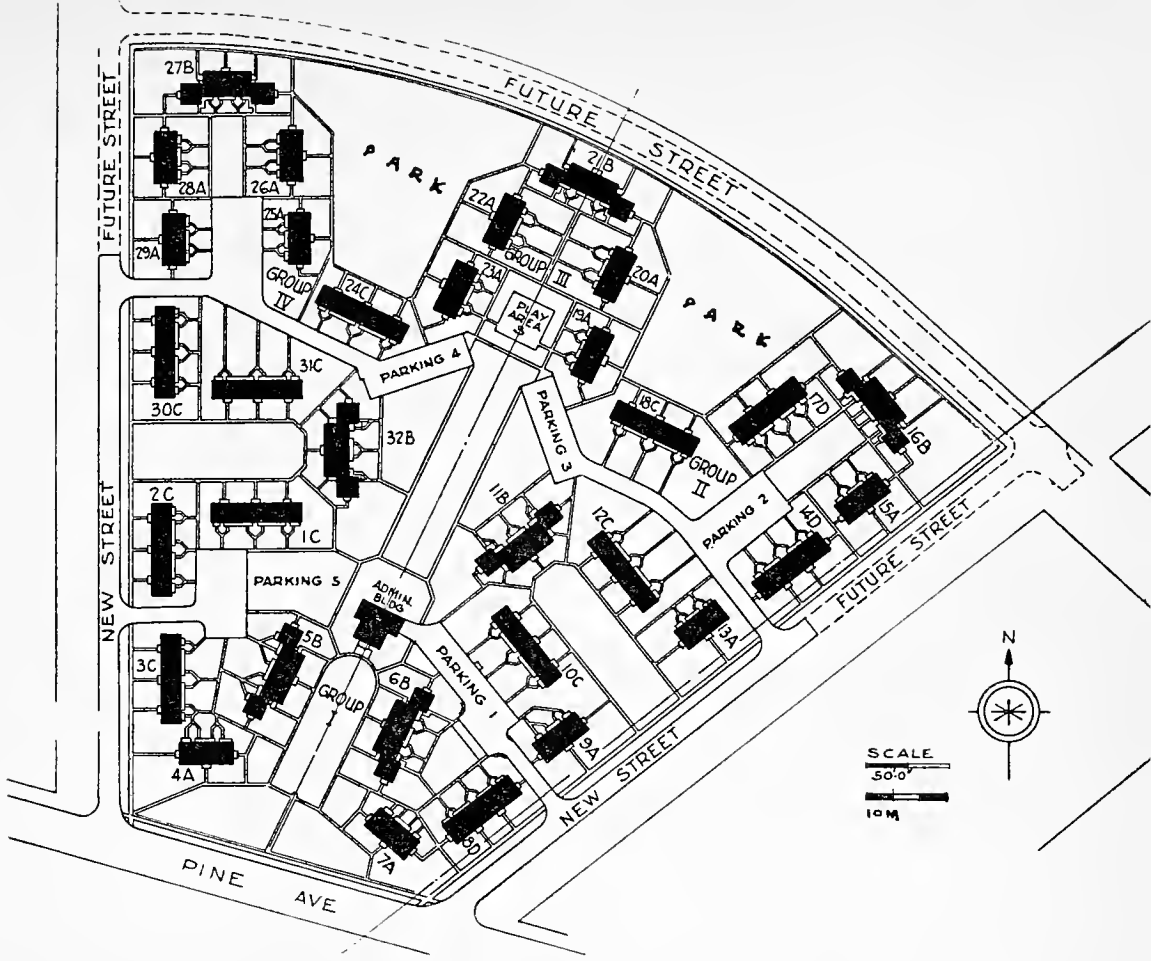


Figure 150. An "extrovert" project. Packard Court, Niagara Falls, New York. Association of Licensed Architects: C. R. Phelps, C. F. Obenhack, W. A. Cannon, R. G. Larke, H. G. Mess, Sewall Smith, C. I. Thiele.

adjacent houses even when there was a common set-back line. Wherever the intention was to house the lower-income groups, the tendency was always to make the lots narrower and narrower as the economic status of the presumed occupants decreased. There were reasons for this:

1. The cost of streets and utilities had to be spread over more houses to reduce first cost, maintenance, and taxes.

2. Developers had the idea that the more lots they could carve out of a piece of land, the greater their profit, and frequently this was true.

3. Where the lots were sold in advance of development, the purchasers were often sold on the idea that they were making a good speculation, since land must go up in value. Under these circumstances, sliver subdivision produced plentiful white poker chips with which the little fellows could gamble.

4. In doing his work, the surveyor had an easy job; no ingenuity or imagination was required; subdivision was done by using a tee square and triangle instead of brains. It never entered their heads that a lot could be other than a simple rectangle except in inconvenient corners, or that with equivalent frontage a group of houses could be arranged to better advantage than if they stood in a straight line each on a similar strip of bacon.

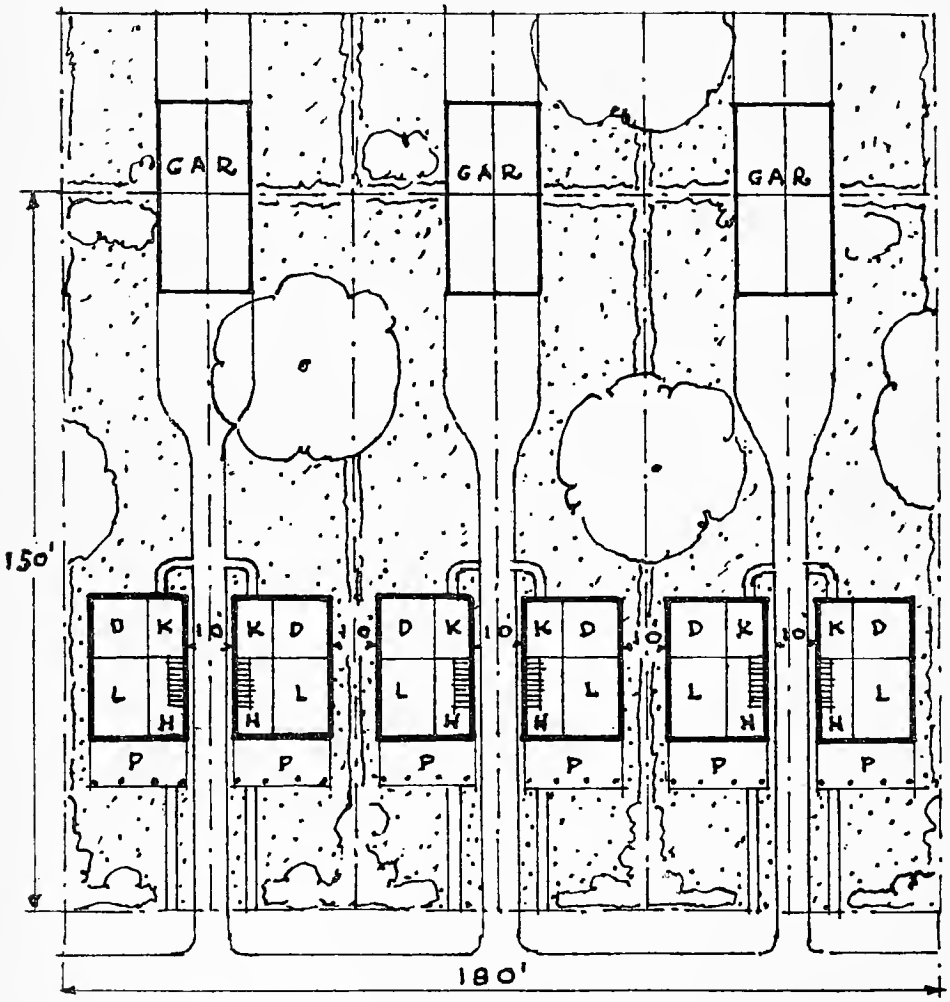


Figure 151 (left). An example of sliver subdivision. Figure 152 (opposite page). An example of group subdivision.

The fallacy of this method is illustrated in Figure 151. Here we find six houses on lots 30 feet by 150 feet. The monotony and lack of visual privacy will be immediately apparent. The back yards are ample in area but unfortunate in shape. In Figure 152 the same area is used for a group of six semi-detached houses of identical size, but instead of an intervening space of ten feet, no house wall is less than sixty feet from an opposite wall. Each unit has a well shaped garden, immediately accessible from the porch. There is not much difference in cost of branch utilities, and the cost of

driveways is less; 152 is more convenient for mail and milk deliveries. Occupants of 152 must be sufficiently good neighbors to arrange for the common care of the lawn in the entrance court. Sidewalk lengths are somewhat greater. Even if the cost of 152 should prove to be slightly higher,

we must ask ourselves whether the environment created isn't worth more than the difference. In which of the two is a man more likely to beat up his neighbor because of some petty annoyance?

In urban communities, where a pattern of subdivision has been set, it is difficult to revise lot lines, especially if blocks are long and narrow, but even there the way is open to the architect of imagination. In suburban subdivision of vacant land there is no reason why lots must necessarily be of the same size and shape with a common setback requirement. In Figure 153 we show the habitual method and two other schemes of subdivision, with identical total frontages for two houses, which we believe offer greater amenity and privacy. It will be objected at once that if taxation is on a front foot basis, these two are open to criticism, but as far as we know, the Medes and the Persians never said that land taxation *must* be on this basis.

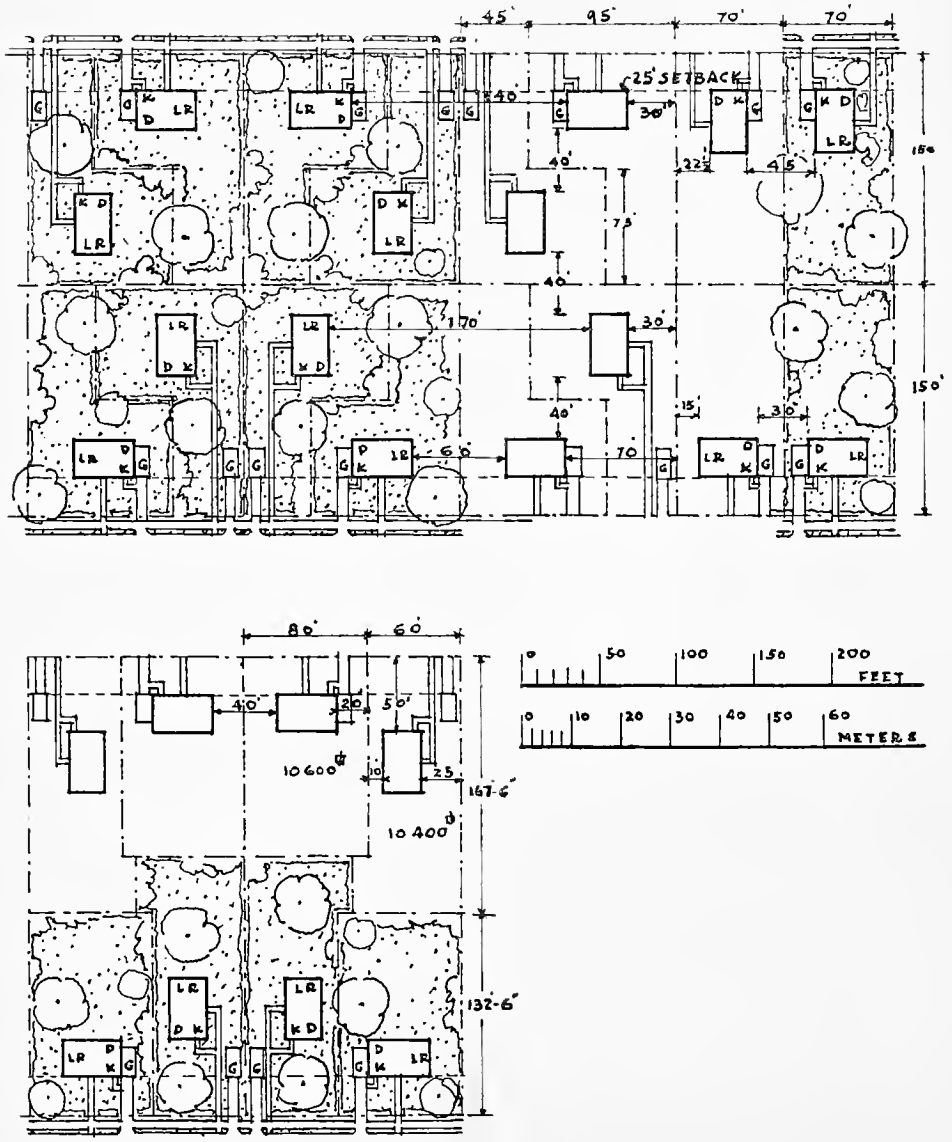


Figure 153. Subdivision methods for a block 300 feet deep. A. Interlocking ells. B. Usual method. C. Varying widths and depths.

Figure 154-A shows an ingenious arrangement of four houses on lots of 4422 square foot area. A reasonable degree of privacy is obtained. (Note that there are nine right angle corners on each lot.) Each house has a garden surrounding the porch on three sides, and the kitchen yards are unobtrusive. Like almost every swastika arrangement with garages, this one has the defects of having traffic on all four sides of the block and an excessive amount of pavement per dwelling. B is a basically different concept of block planning; streets for vehicular traffic only, no individual garages; all walks on the interior of the block and pedestrian cross traffic away from the street corners. Lots are interlocking tees, the widest portion fifty feet. This arrangement creates a spacing of about 35 feet between the ends of the buildings shown.

Narrow frontages have even a worse effect on apartment house

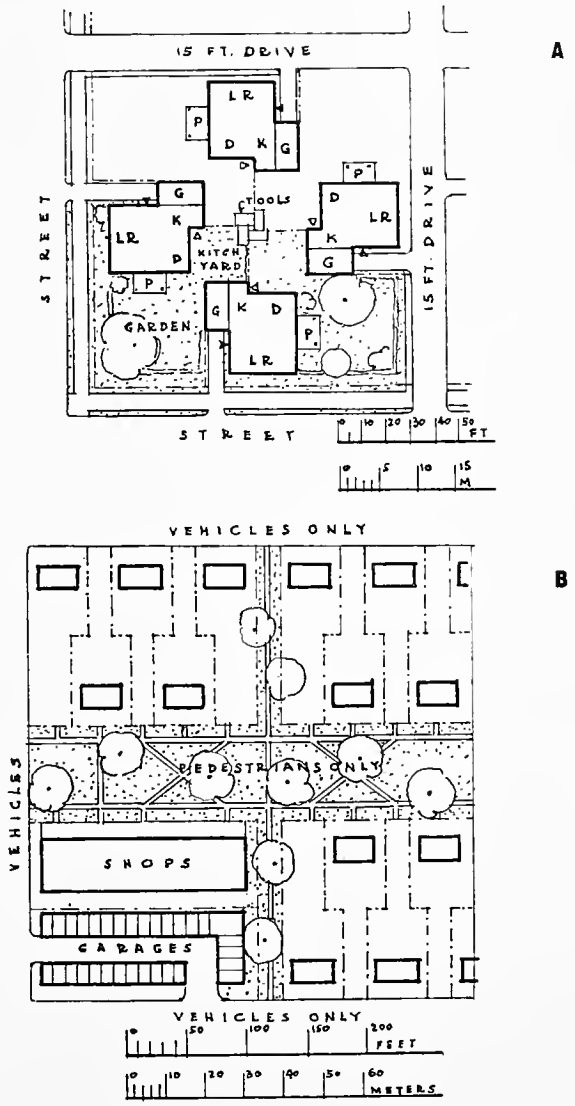
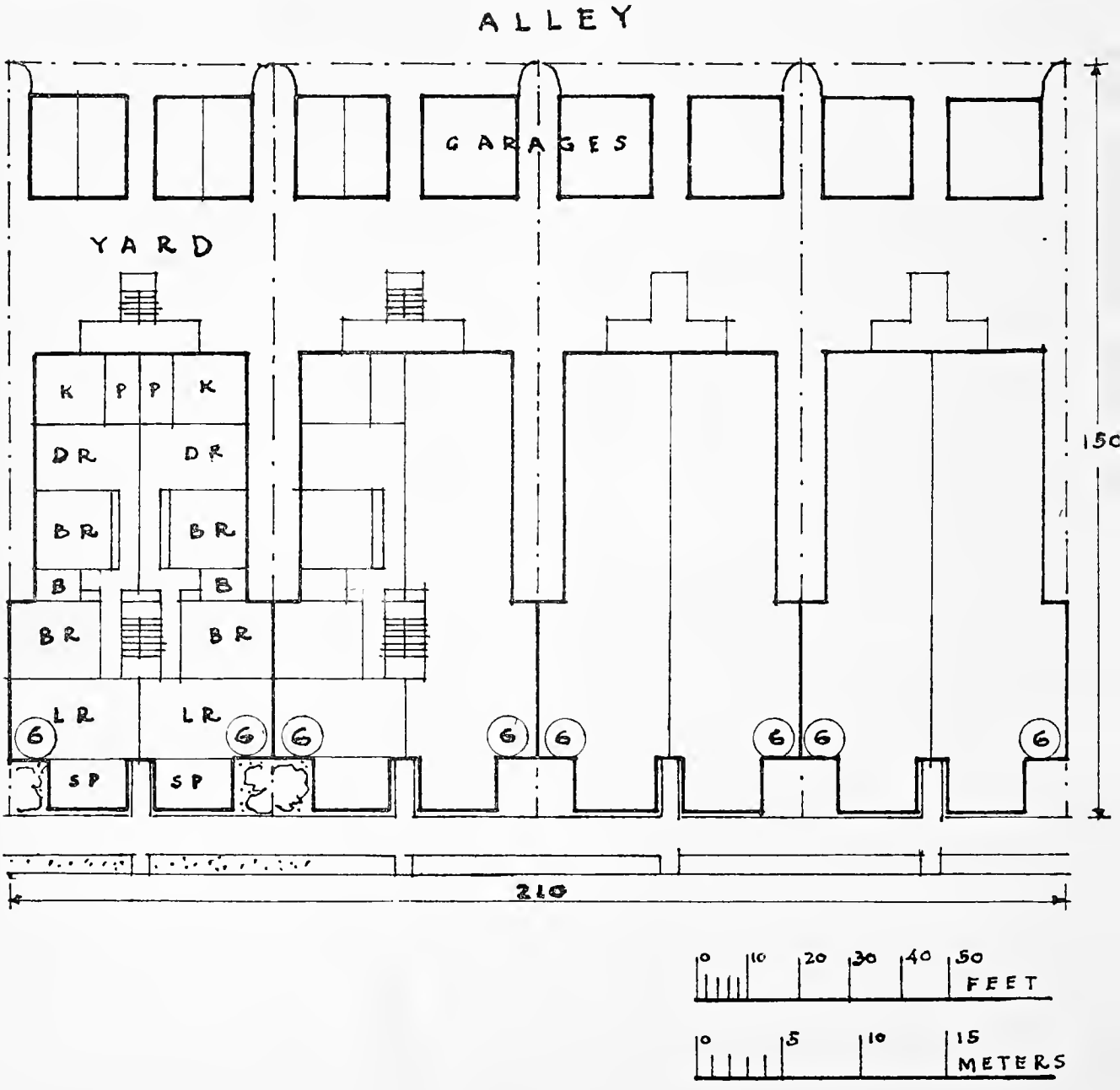


Figure 154. Methods of block subdivision. A. Swastika arrangement. B. Complete separation of pedestrians and vehicles. A: After Henry Wright. B: After Alexander Klein.

planning than on individual homes. In the latter instance we arrive ultimately at the row house, which as a living unit is perfectly satisfactory if two rooms deep. With apartments, the almost inevitable result is a string of rooms reached by a long interior corridor (see Figure 155). Here again a guiding factor in the method of subdivision is the desire to sell the buildings to buyers who have little to invest. That something better is possible is evident in 156, with fewer rooms per floor, but all of them good with respect to light and outlook, 34 rooms as compared to 24 rooms in Figure 155. It is to be noted that in each instance there is room for garages for each family, if the buildings are two stories in height but not if there are three habitable floors.

Figure 155. A small urban site planned to sell as four units. There are eight six-room apartments to a floor, and half of the rooms have inadequate light and privacy.



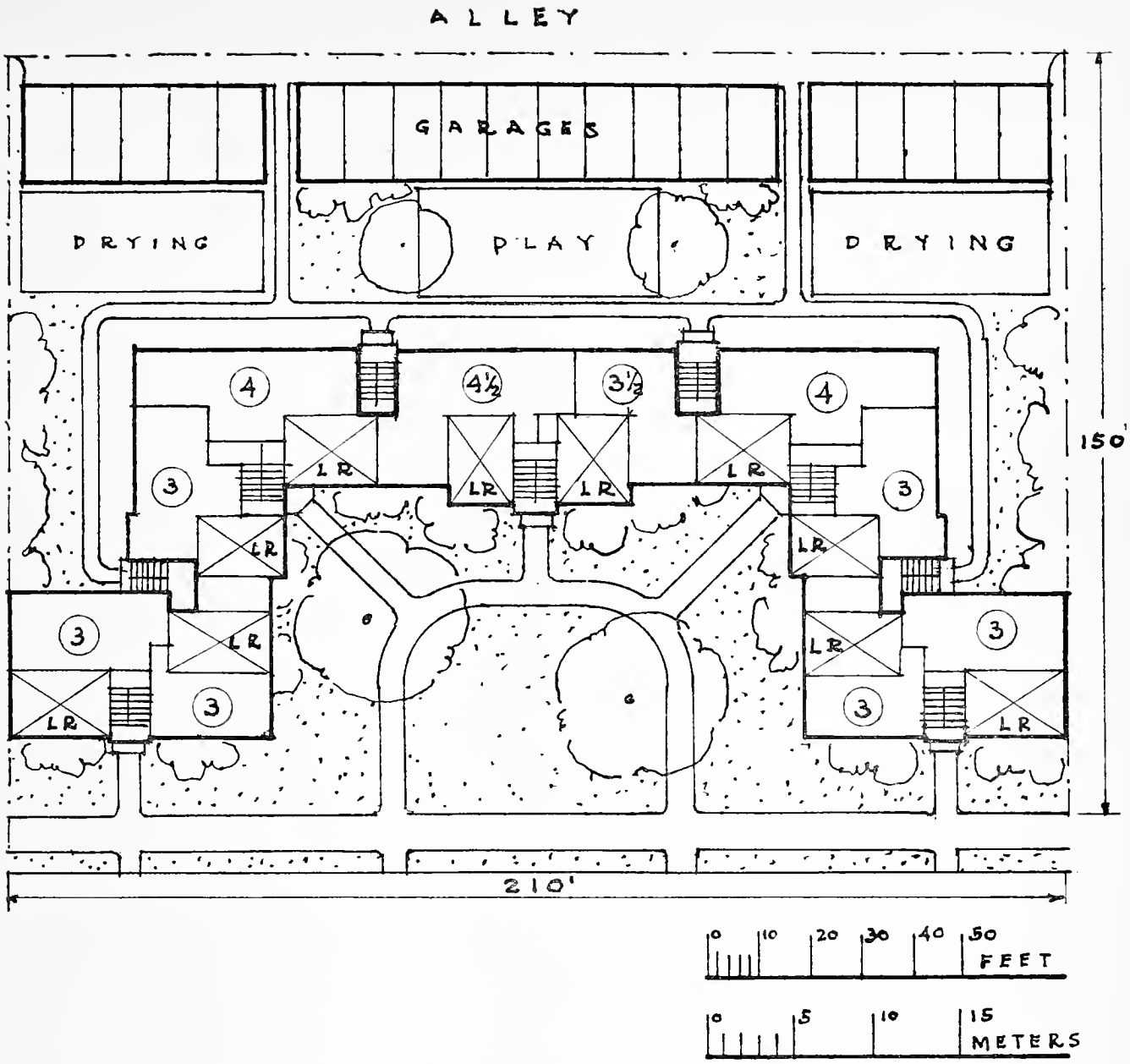


Figure 156. The same property as in Figure 155, planned as an investment unit. There are ten apartments and a total of thirty-four rooms to a floor, and all have adequate light. Federal Housing Administration.

subdivisions

It is not proposed to discuss here the technology of subdivision practice in detail. In recent years it has undergone measurable improvement, due largely to the efforts of the Land Planning Division of the Federal Housing Administration. Readers interested in their detailed recommendations are referred to their *Technical Bulletin No. 7, Planning Profitable Neighborhoods.** It tells what to do and what not to do in the layout of streets and lots. Unfortunately it stops with consideration of only two of the three dimensions which enter into a design; the third dimension is largely ignored. A study of our illustrations leads to the conclusion that subdivision practice must include the architectural design of the grouping of the buildings, with the location of each house and the general massing of structures determined in advance. The mere establishment of front, side, and rear setback requirements will not do the trick. If the buildings can be designed at the same time as the lot layout, so much the better. This is admirably illustrated in Figure 157. Here planner and architect working together have achieved a grouping of variety and charm, in which street vistas have been carefully designed.

The same care for the ultimate result is evident in the planning of Radburn. The planners laid out their super blocks with series of culs-de-sac abutting on interior green areas for the common use of the occupants. Figure 158-A shows one of the earlier culs-de-sac in that development. With the number of houses and consequent narrowness of individual lots, the result would have been a disorderly jumble, had not the houses been completely designed to give the rooms good exposure and privacy, and the exterior appearance a sense of order.

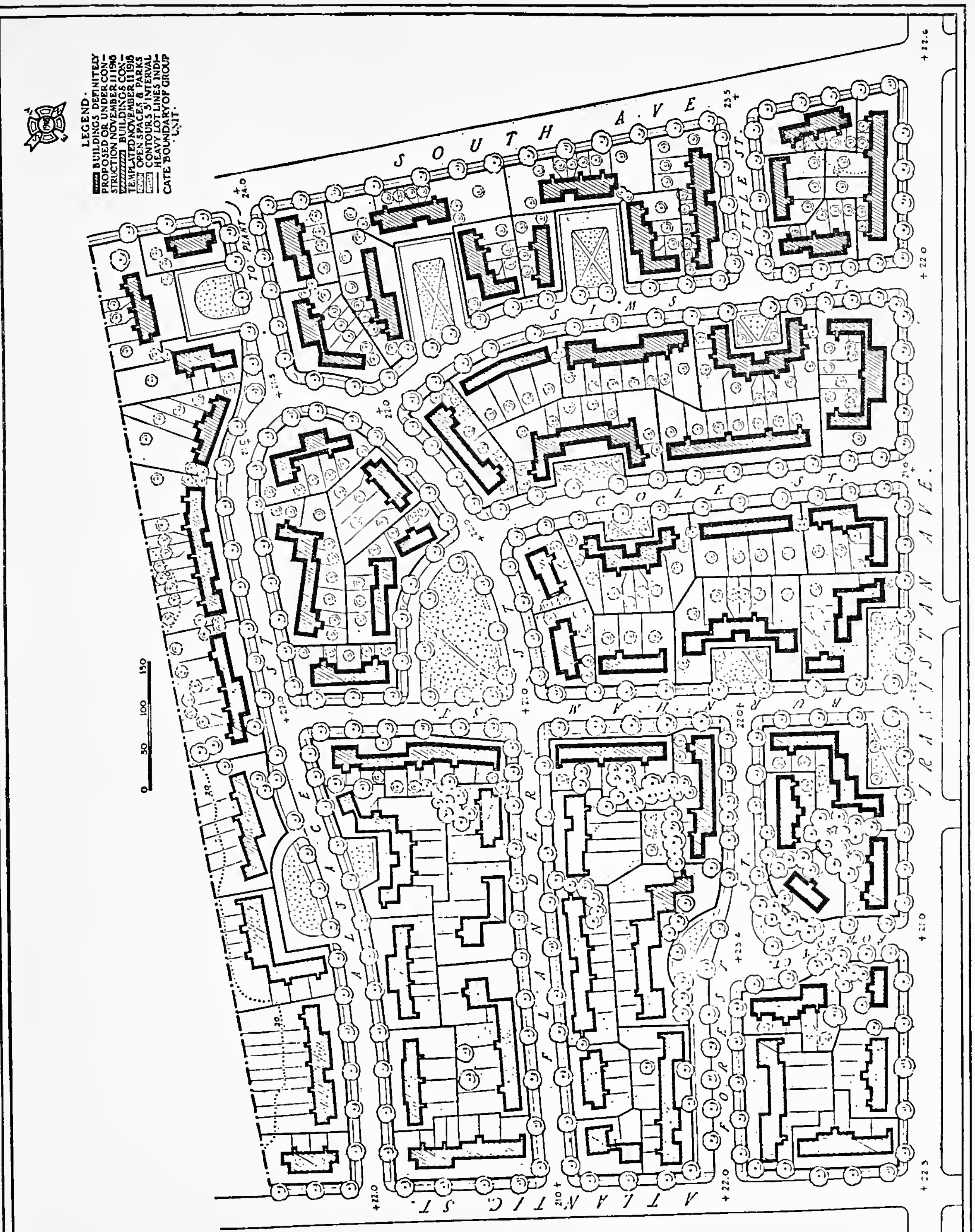
the cul-de-sac

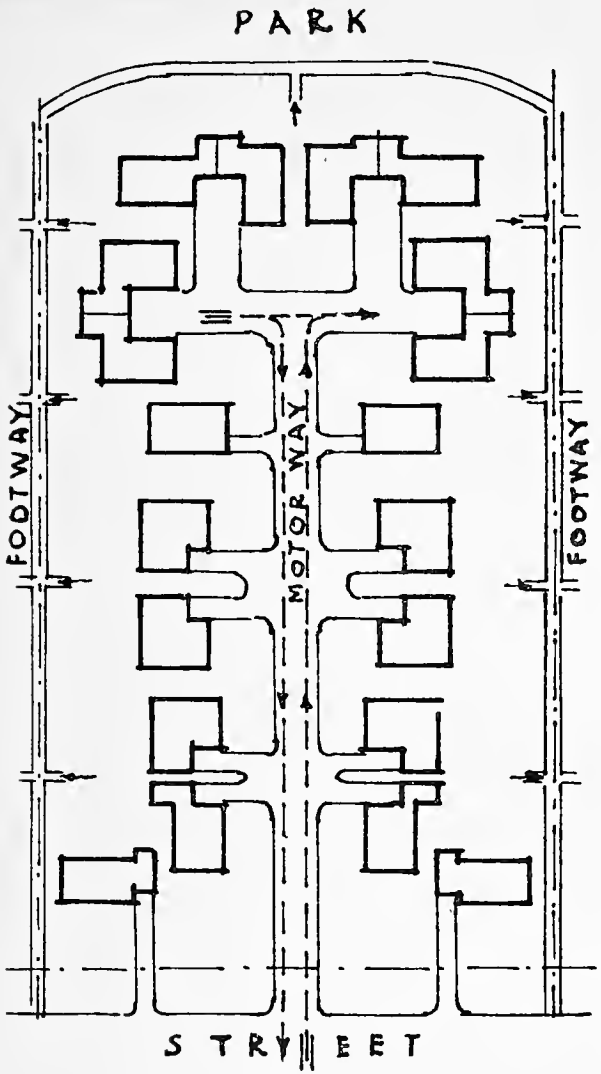
This form of grouping has had a considerable vogue, based largely on the results achieved at Radburn. It postulates the following: The central drive is a service way to the houses and garages. The principal exposure of the important rooms is away from it, towards the gardens and foot paths that lead to the common green areas, making it unnecessary to use the driveway for walking. With the green areas of adjacent blocks connected by underpasses, complete separation of pedestrian and motor traffic is possible.

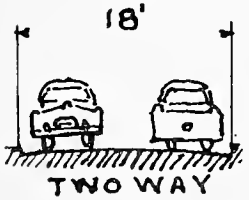
The thinking back of this idea would be irrefutable if human action always followed a logical pattern, but it has been found that children who

*U. S. Government Printing Office.

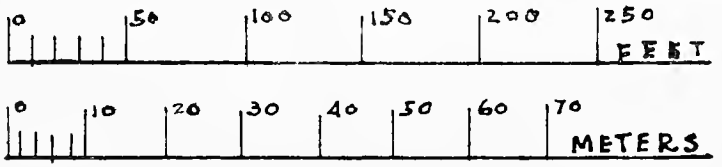
Figure 157. The happy result of cooperation between architect and planner. Crane Trust, Bridgeport Connecticut. R. Clipston Sturgis and A. P. Hepburn, associate architects; Arthur A. Shurtleff, town planner.


LEGEND
BUILDINGS DEFINITELY PROPOSED OR UNDER CONSTRUCTION NOVEMBER 11 1918
BUILDINGS CONTEMPLATED NOVEMBER 11 1918
OPEN SPACES & PARKS
CONTOURS 5' INTERVAL
HEAVY LOT LINES INDICATE BOUNDARY OF GROUP UNIT
0 50 100 150
SOUTH AVE.
LITTLE ST.
SIMS ST.
COLE ST.
IRANISTAN AVE.
ATLANTIC ST.
TO PLANT


PARK
FOOTWAY
MOTOR WAY
FOOTWAY
STREET


18'
TWO WAY

A


0
50
100
150
200
250
FEET
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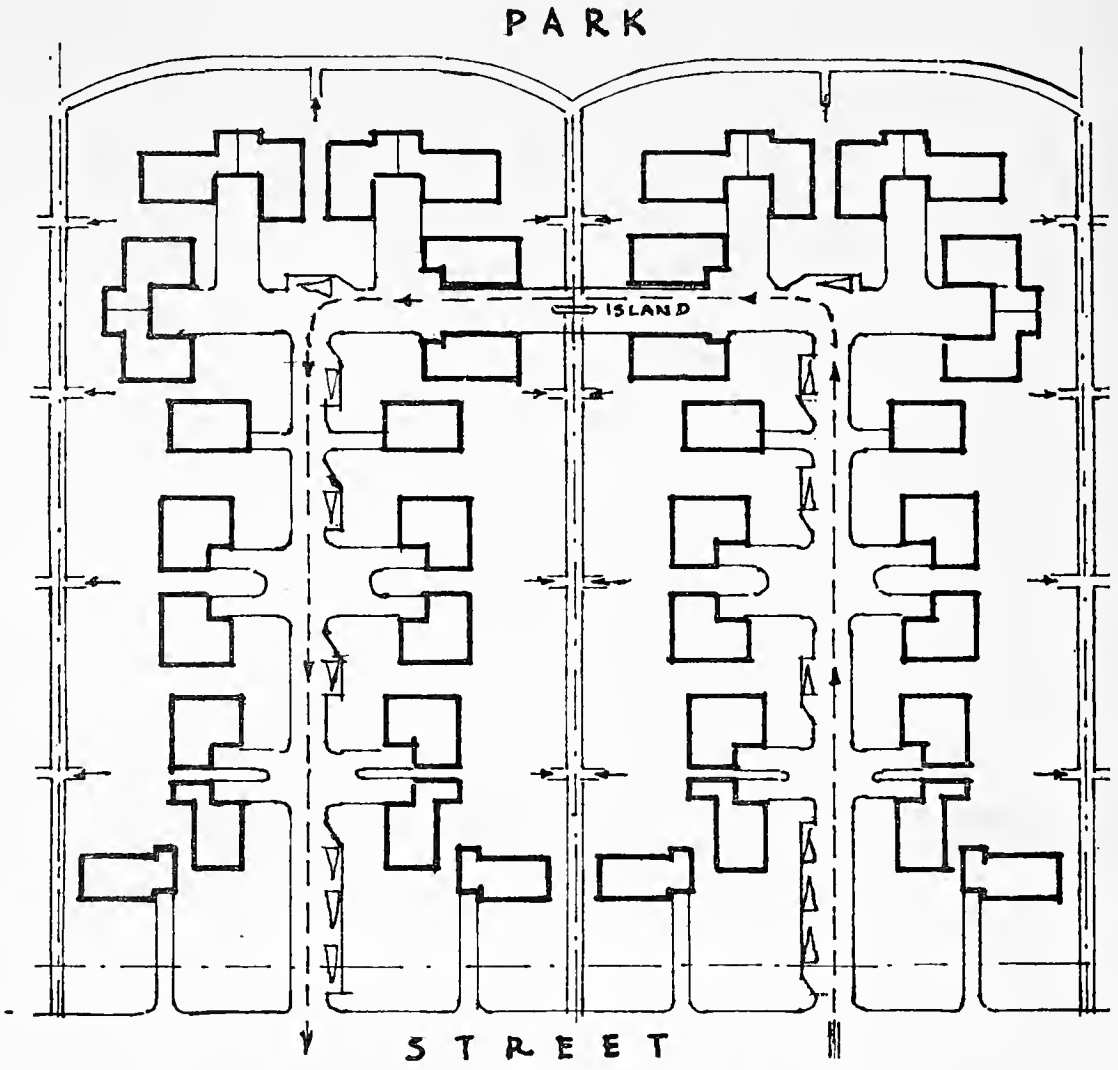
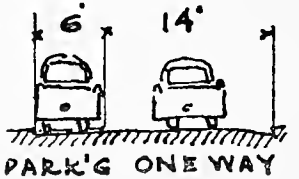
10
20
30
40
50
60
70
METERS


PARK
ISLAND
STREET


6'
14'
PARK'G ONE WAY

B

keep their bicycles and tricycles in the garage use the driveway for play, since it is convenient, and will walk on it if a schoolmate happens to live on the opposite side. In a word, there is no such thing as complete elimination of traffic hazards. The best we can do is to reduce them to a minimum. We must ask ourselves then, what is the greatest deterrent to traffic accidents? The most frequent cause of traffic accidents is speed, and it is fair to say that the best way to guard against accidents is to plan a layout so that a build-up of speed is impossible. The cul-de-sac does this when it is short, as in Figure 159. In a longer cul-de-sac, say 600 feet, the hazard is as great as in any ordinary street. In Figure 158-A it is not serious; but the traffic is two-way, in itself a danger. In B two units have been joined with a one-way loop drive. The island at the middle is the one point where a person using the garden walk must be on his guard against passing cars, but they will come from only one direction. This scheme offers a possibility of parking visitors' cars, which is not the case in A.

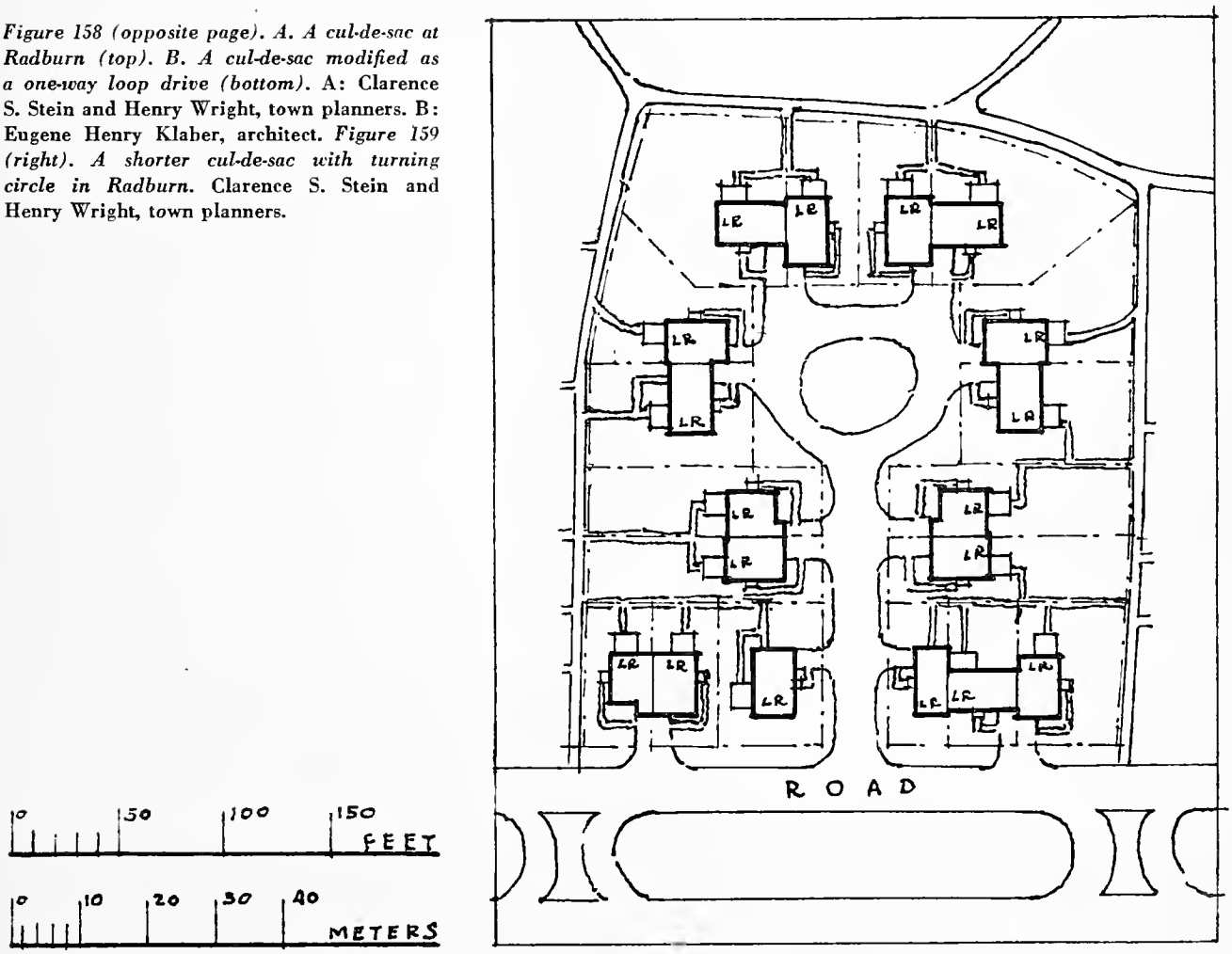
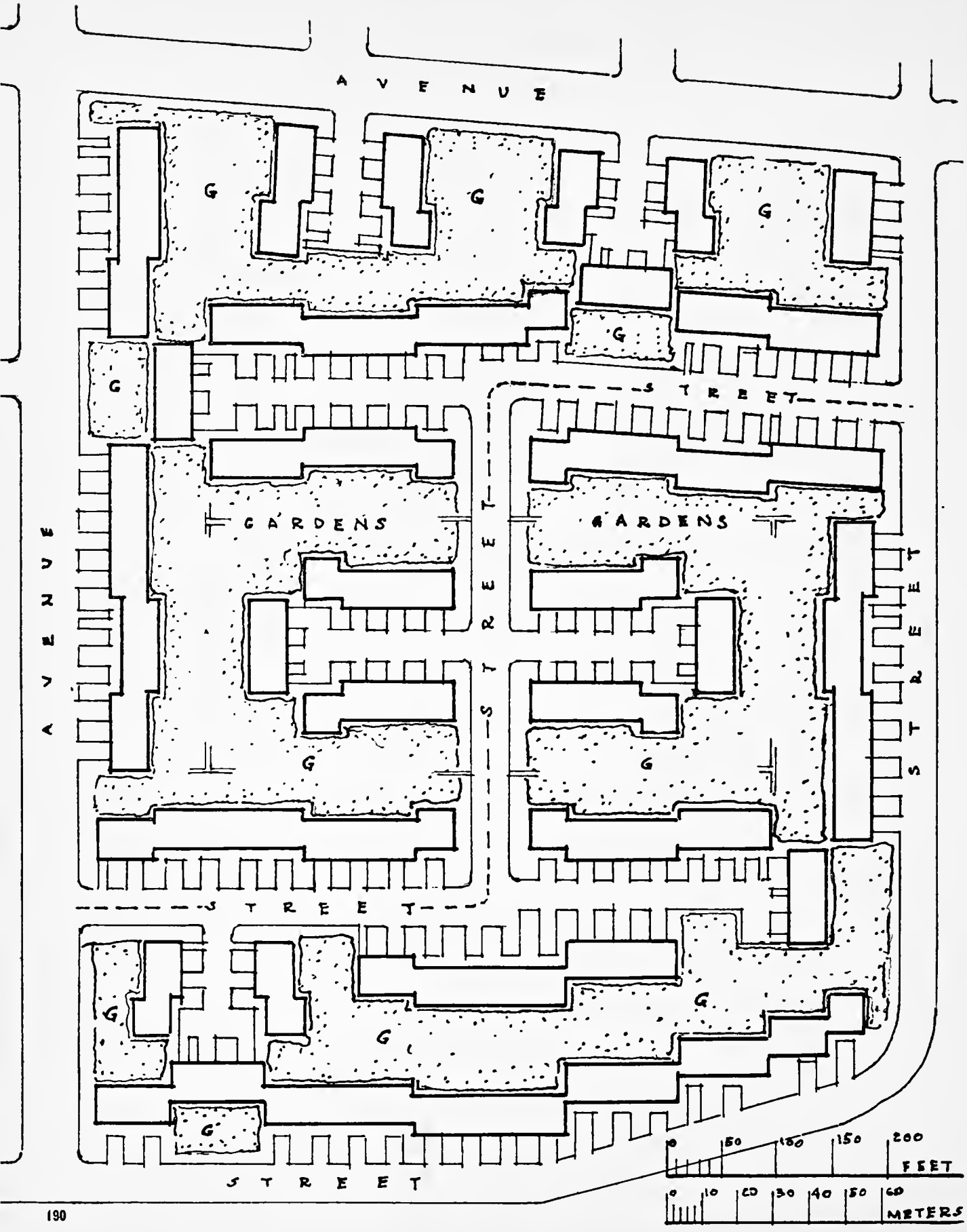


Figure 158 (opposite page). A. A cul-de-sac at Radburn (top). B. A cul-de-sac modified as a one-way loop drive (bottom). A: Clarence S. Stein and Henry Wright, town planners. B: Eugene Henry Klaber, architect. *Figure 159 (right). A shorter cul-de-sac with turning circle in Radburn.* Clarence S. Stein and Henry Wright, town planners.


AVENUE
G
G
G
G
STREET
GARDENS
GARDENS
AVENUE
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STREET
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G
STREET
G
G
G
G
0 50 100 150 200
FEET
0 10 20 30 40 50 60
METERS

The cul-de-sac properly designed is a good layout, but other forms are also justifiable. We feel that the essential objectives are one-way traffic and roads which change direction to force slow-down of traffic. Such an arrangement is shown in Figure 160. This plan is not devoid of danger caused by cars backing out of the garages, especially on the perimetrical streets, but it does provide reasonable safety in the interior of the block.

narrow and wide blocks

We have observed the unfavorable effect of narrow lots on planning. What is true of lots is equally true of city blocks. The narrow block is a bane to planners, and it is open to question whether it is of advantage to anyone except the sell-out and clear-out promoter. Figures 161 and 162 very clearly demonstrate this. They comprise three layouts: A shows an existing development of row houses using two blocks 175 feet by 600 feet; in B the blocks have been united and the central street omitted; in 162 a third block has been added and a superblock 600 feet by 625 created. It will be noted that in A there is virtually no private garden space, due to the housing of autos within the buildings. By arranging the garages in compounds, each house in B and 162 has a small garden space and common play areas are provided. It will be readily conceded that they offer greater amenity of living than A, but how about the cost? We maintain that no city can afford to have 34.4% of its gross area in streets and alleys. But the city is not the only party whose interests are to be considered; there are also the developer and the home buyer—where do their interests lie?

To answer this problem, the writer made a study assuming a raw land value of $3000 per acre. It was based on 1948 prices. A comparison was made between scheme A and a single block scheme analogous to B. The study produced figures from which the following comparison of A and B is derived:

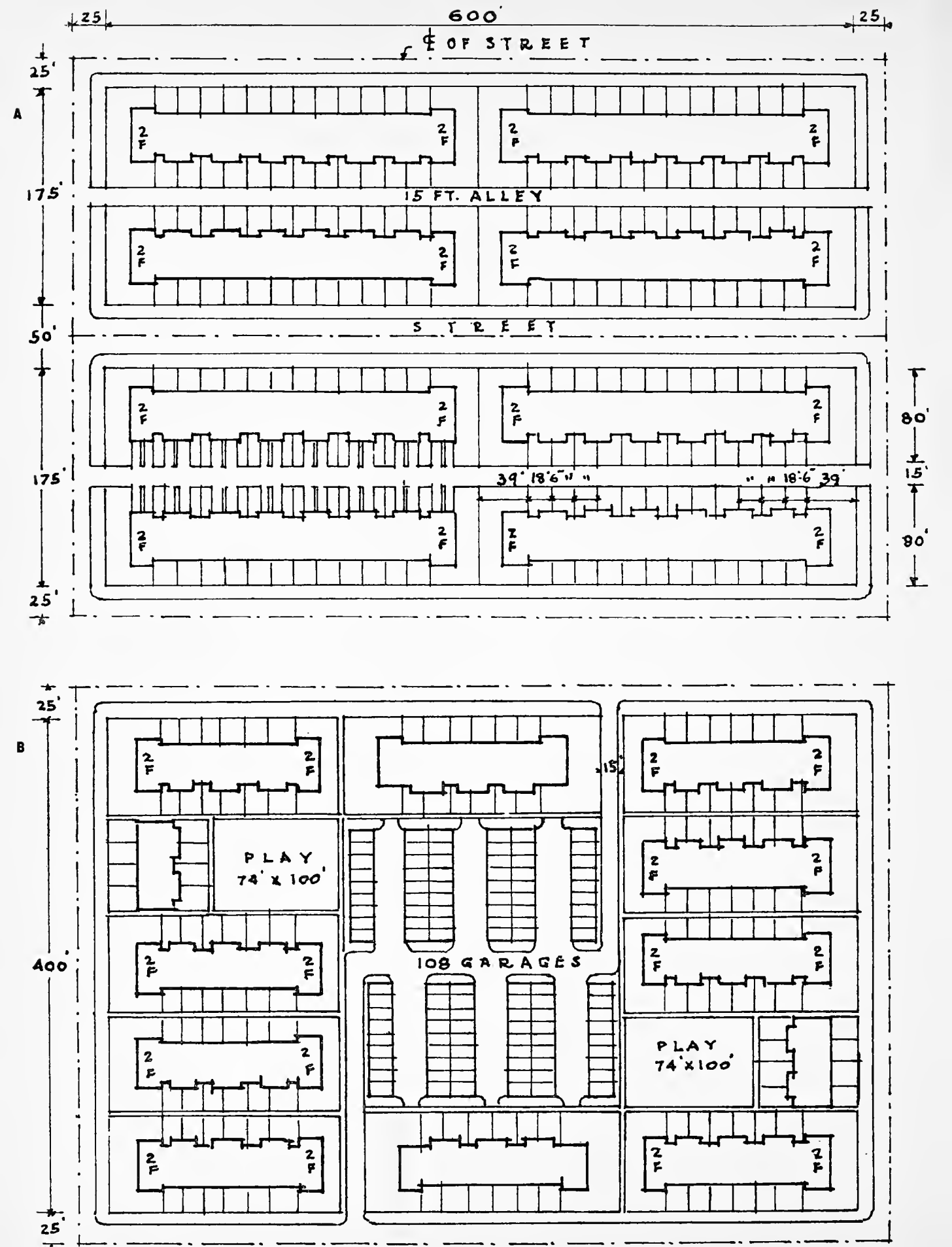
Area of land to center line of boundary streets 6.7 acres

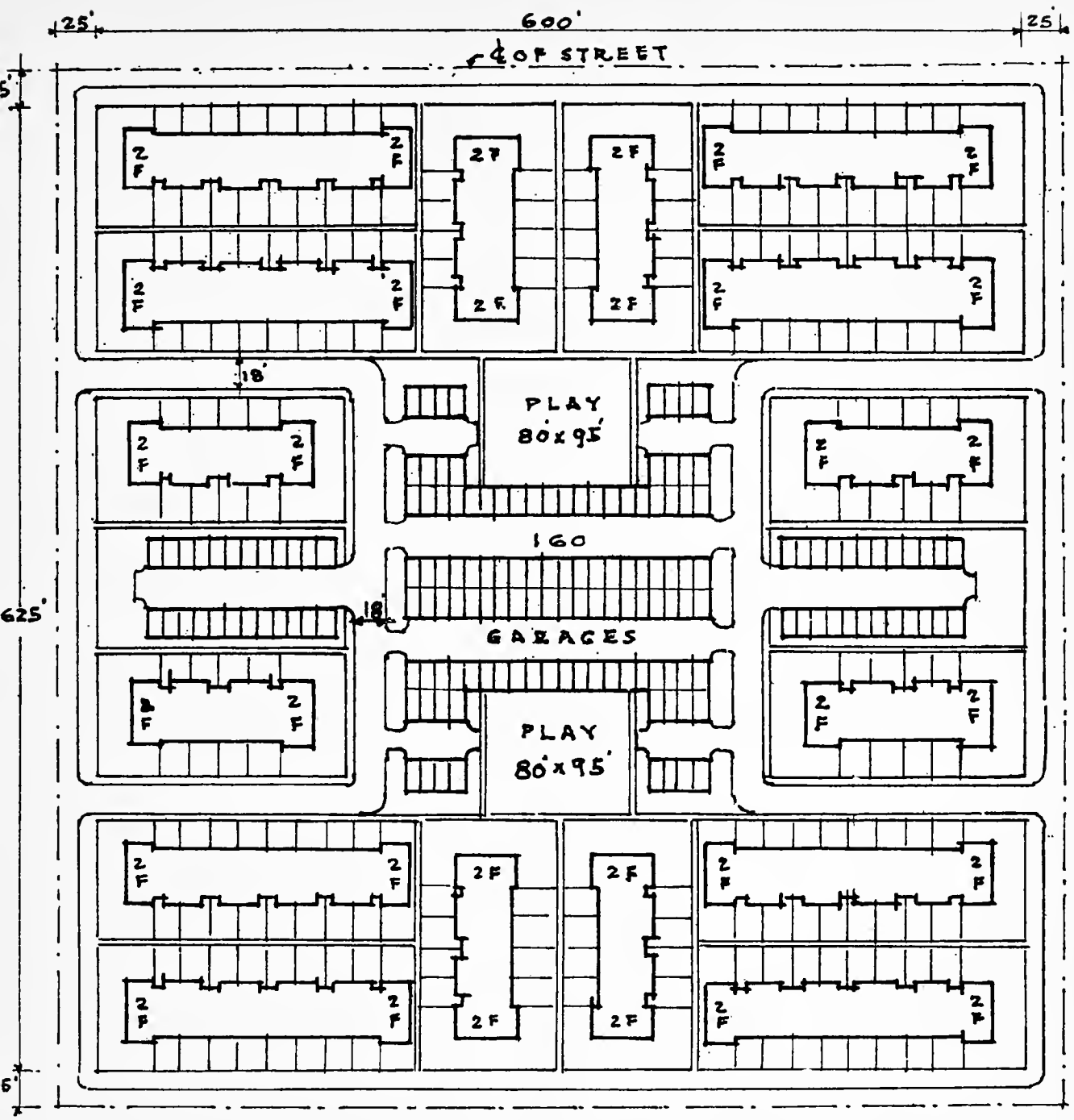
	A	B
Number of dwelling units	128	108
Cost of land to developer per dwelling unit	$157.20	$186.00
Cost of land improvements to developer per dwelling unit	860.00	629.00
TOTAL	$1,017.20	$815.00
Cost to city of improvements per dwelling unit	180.30	192.40
TOTAL	$1,197.50	$1,007.40
Annual maintenance cost to city per dwelling unit	22.28	16.20

Figure 160. Block layout with cross street offset to retard traffic. Federal Housing Administration.

The following conclusions may be drawn from these figures:

1. Unless the land is very expensive, the larger the blocks, the less the developer has to invest in land and land improvements.


600'
25
25
℄ OF STREET
A
25'
175'
15 FT. ALLEY
50'
STREET
175'
25'
80'
15'
80'
39' 18'6" 11 11 11 18'6" 39'
B
25'
400'
25'
PLAY
74' X 100'
108 GARAGES
15'
PLAY
74' X 100'
2 F



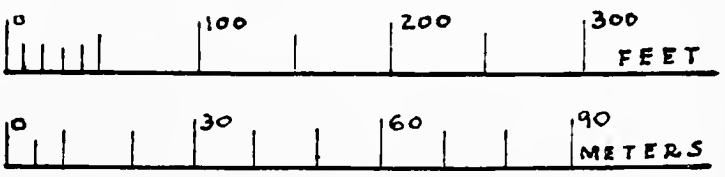


Figure 161 (opposite page). A. A recent Philadelphia development with a gross area of 6.7 acres for 128 families. Streets and alleys take up 34.4% of the gross area. B. A restudy, omitting one street. In the gross area of 6.7 acres, 108 families are accommodated. Streets and alleys account for 21 per cent of the gross area. Figure 162 (above). A superblock omitting two streets. In the gross area of 10.45 acres, 160 families are accommodated. Streets and drives account for 19.7 per cent of the gross area.

2. The lower the permissive dwelling density, the less the possible advantage of the narrow block to the developer.

3. In B the added initial cost to the city per dwelling unit will be written off by savings in maintenance and repairs in two years. Thereafter, it will save every year, since maintenance and repairs are recurring costs for which, incidentally, the properties tend to become less able to pay.

4. The amount which the purchaser must be charged to pay for land and land improvements is less on the larger block. Even if it were slightly more, he would still have a better asset to offer in case of resale.

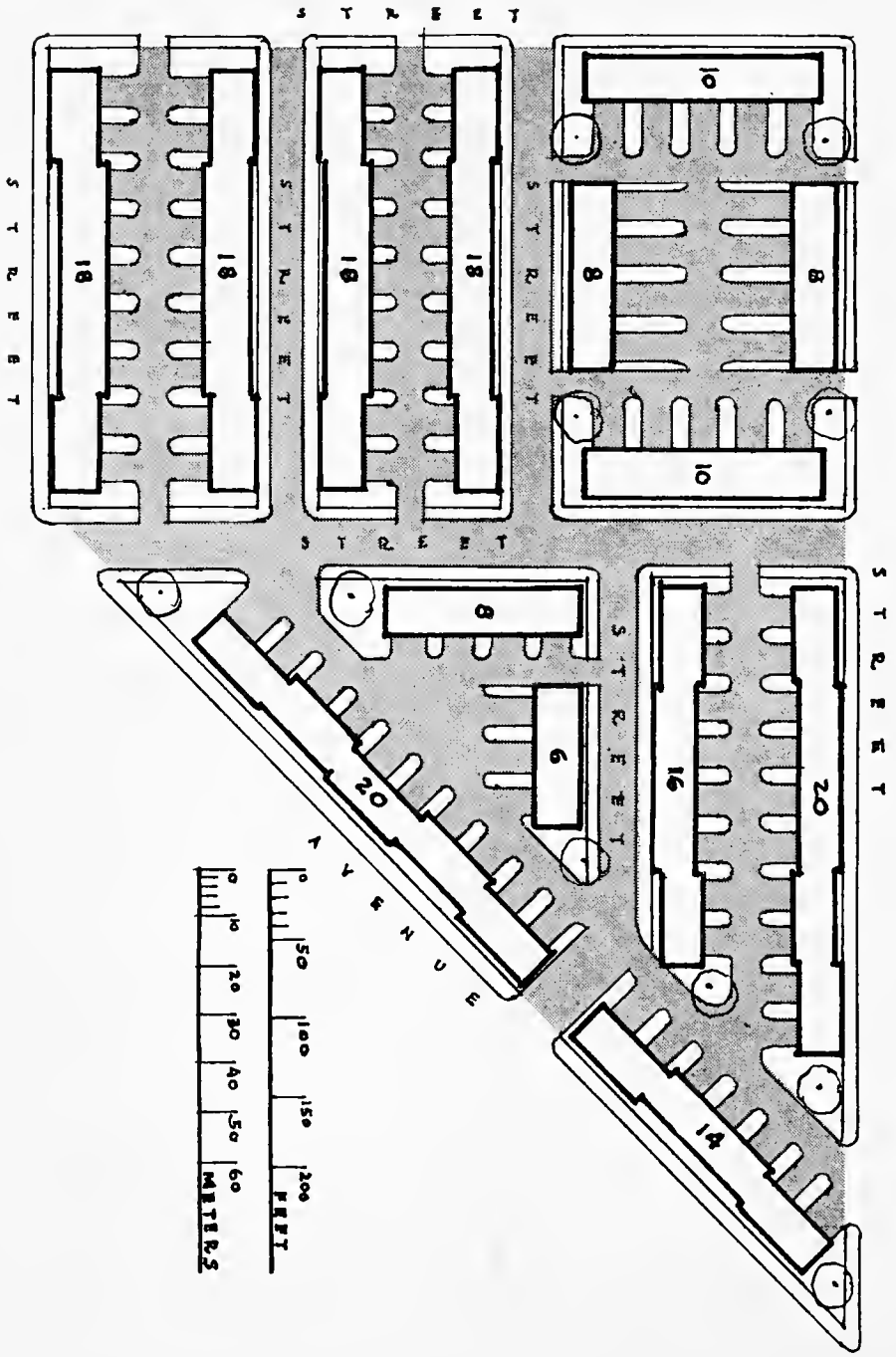


Figure 163. Effect of excessive pavement on livability. Number of houses, 192; number of garages, 192. Pavement is shaded.

Note that building cost has not been considered in this discussion. Will house plus outside garage cost more than if the garage is in the house? Perhaps, but certainly not the full cost of the garage which in 1948 was reported to be about $500. The elimination of the garage may permit a more economical planning of the dwelling or create an added usable space.

Figure 163 shows on a larger scale how very little green space is left when garages are in the basements of row houses. This is perhaps an extreme case, but an examination of 164 will show that something much better is possible.

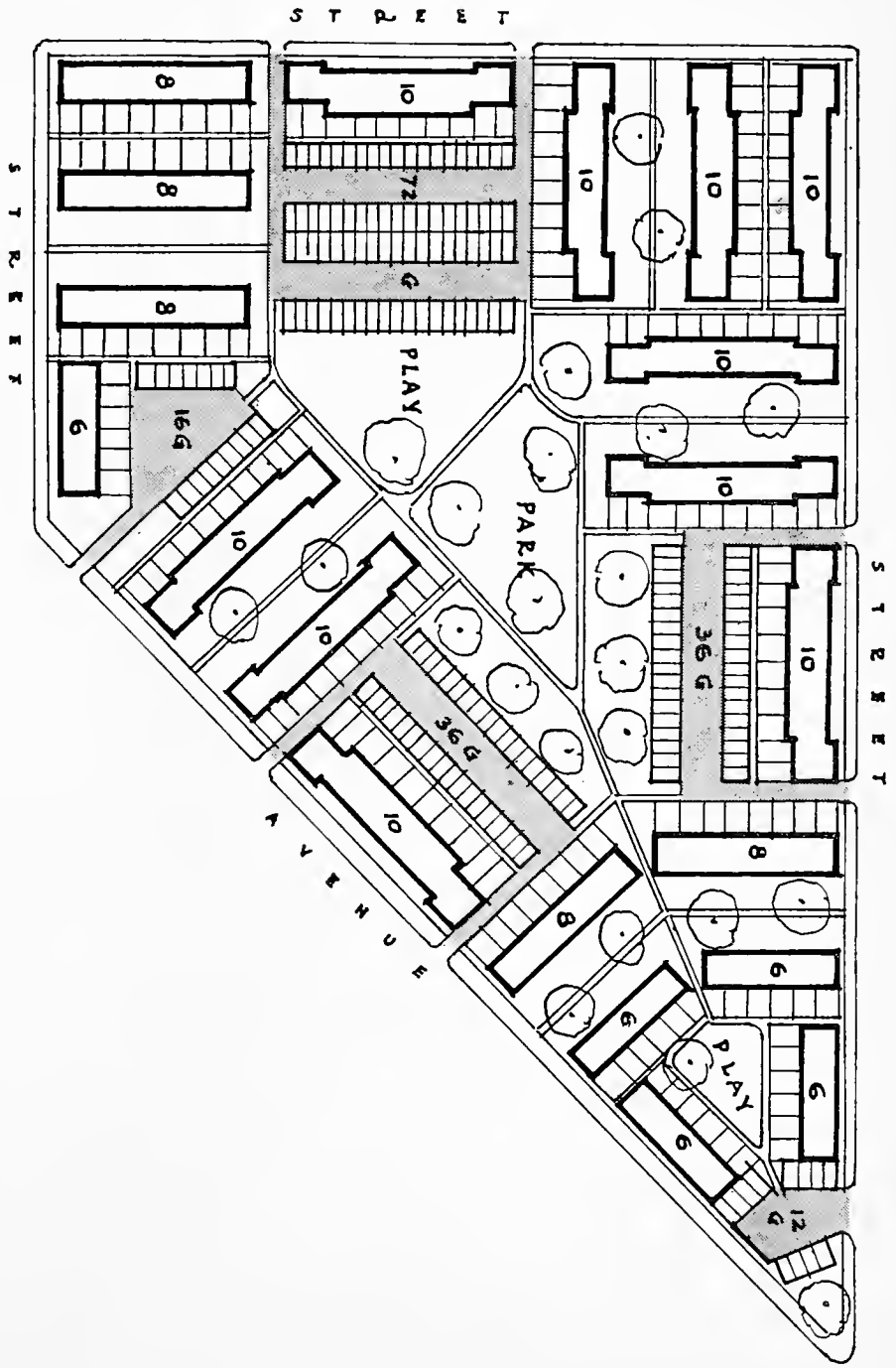


Figure 164. Number of houses, 170; number of garages, 172. Pavement is shaded. Eugene Henry Klaber, architect.

excessive building length

The undesirability of very long buildings has been mentioned. This is illustrated in Figure 165. A is a section of a public housing project as constructed; B is a restudy made for purposes of comparison, with shorter buildings. The shape of the blocks has been slightly modified in B, but the resultant density is identical. In A the building groups are over 300 feet in length. The effects of this one factor are the following:

1. A uniform spacing of 55 feet between buildings both in front and rear; in B the front courts are all 80 feet wide or more.

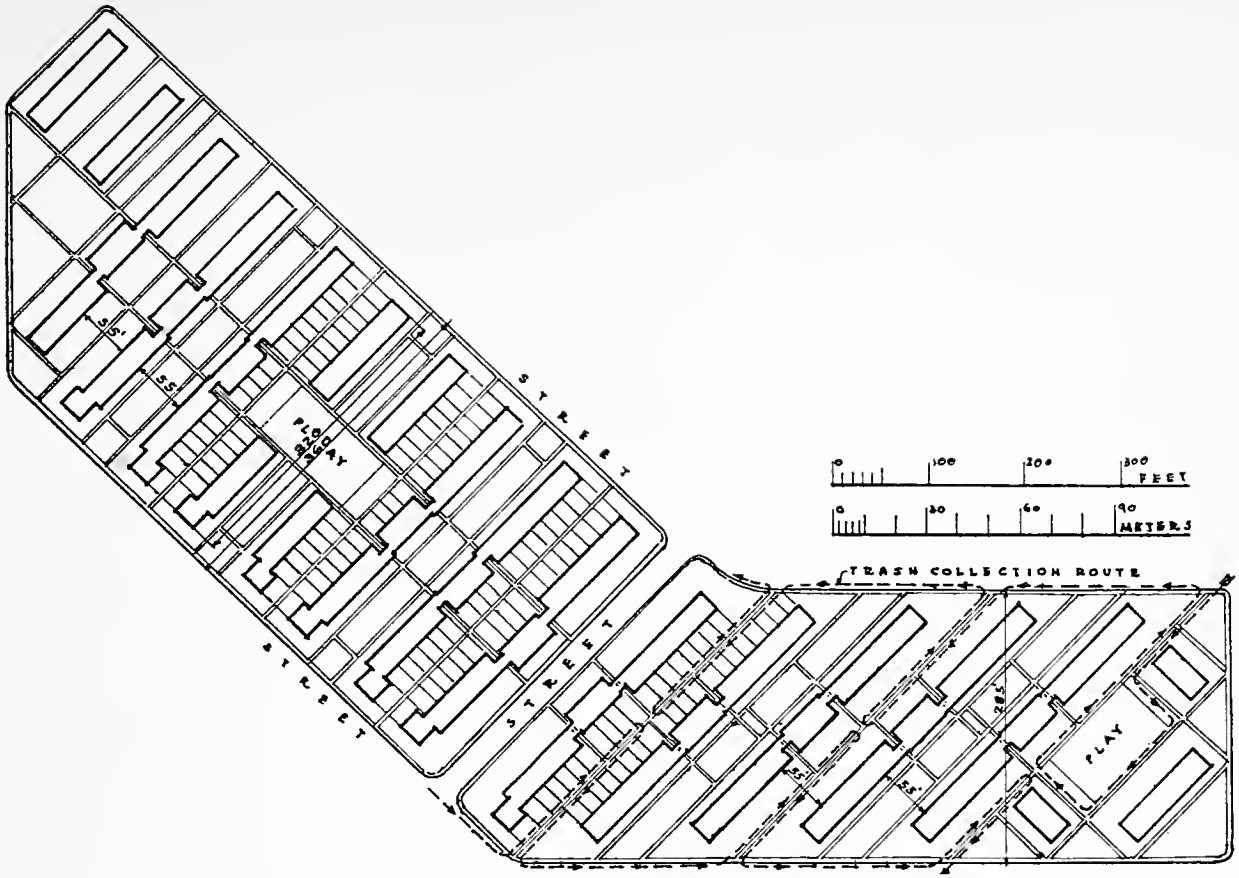
2. Waste removal must be from the perimeter, which creates a much longer time and effort consuming route than in B, where a one-way controlled service drive, used for this purpose only, greatly simplifies the service. B has trash stations along the drive, which may not be advisable if the city makes door to door collections. Even in that case the service is easier since so many of the back yards are directly on the route.

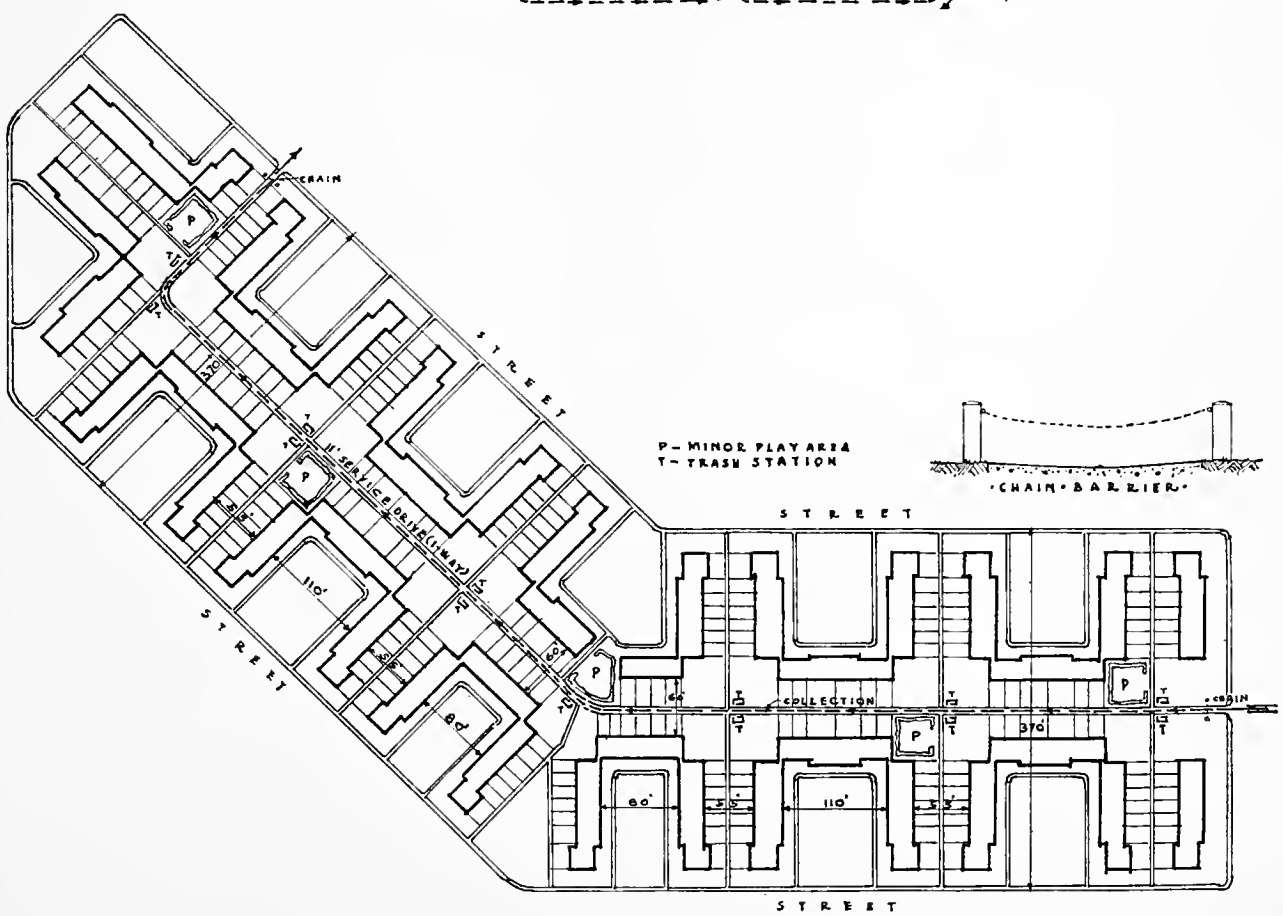
3. Plan A has almost 50% more sidewalk than B, largely because the buildings run diagonally across the block.

4. Each block in A has a sizable play area. Since there is a large playground in the project, these are evidently intended for use by younger children. Safe access to these areas has been provided, but anxious mothers have in some instances to walk a considerable distance to see whether their offspring are happy or bawling their woes to an indifferent world; in B their maximum walk is 150 feet from the garden gate to a point where they can see where their children are, or at least ought to be.

	A	B
Area in acres	11.65	12.55
No. of families	282	308
Density per acre	24.5	24.5
Linear feet of sidewalks, excluding perimeter and stubs	9420	6305
Linear feet of sidewalks per unit	33.3	20.5
Square feet of street pavement	9300	
Square feet of service drive pavement		12,900

Figure 165. A. Part of a public row house project with an excessive length of building groups. Note the length of the collection route. B. Shorter building groups and controlled service drive.


A
STREET
STREET
STREET
PLG 320 AY 260
0 100 200 300 FEET
0 30 60 90 METERS
TRASH COLLECTION ROUTE
PLAY


B
CHAIN
P
T
STREET
P- MINOR PLAY AREA
T- TRASH STATION
11' SERVICE DRIVE (1 WAY)
110'
80'
CHAIN • BARRIER •
STREET
COLLECTION
CHAIN
60'
110'
STREET

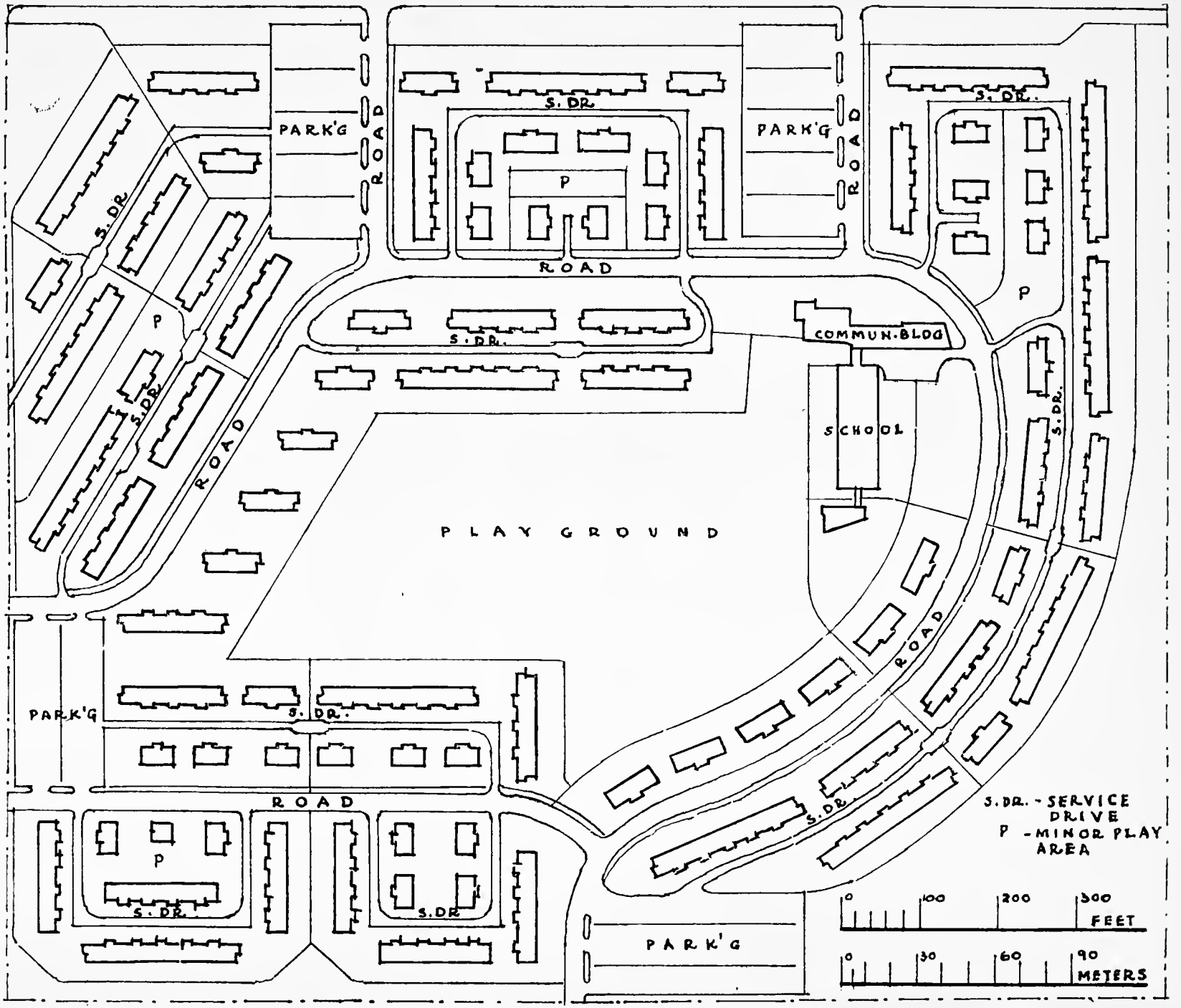
The use of service drives between groups of dwellings does not create a serious hazard, provided they are so planned that they do not invite through traffic. Figure 166 shows one public housing project embodying this principle. In this plan no one will enter the drives except for a definite local purpose, since the roads are much more convenient for drivers who merely wish to pass through. One possible objection to the plan is that most children will have to cross a road in going to school. This plan merits study for the logical disposition of its various elements: residential areas, play space, and parking. The location of parking areas around the perimeter of the site does not mean that residents will not drive up to their own door; they will do so for purposes of pickup and delivery, but this arrangement avoids the unsightly appearance which would be created if cars were parked all over the site.

method of site planning

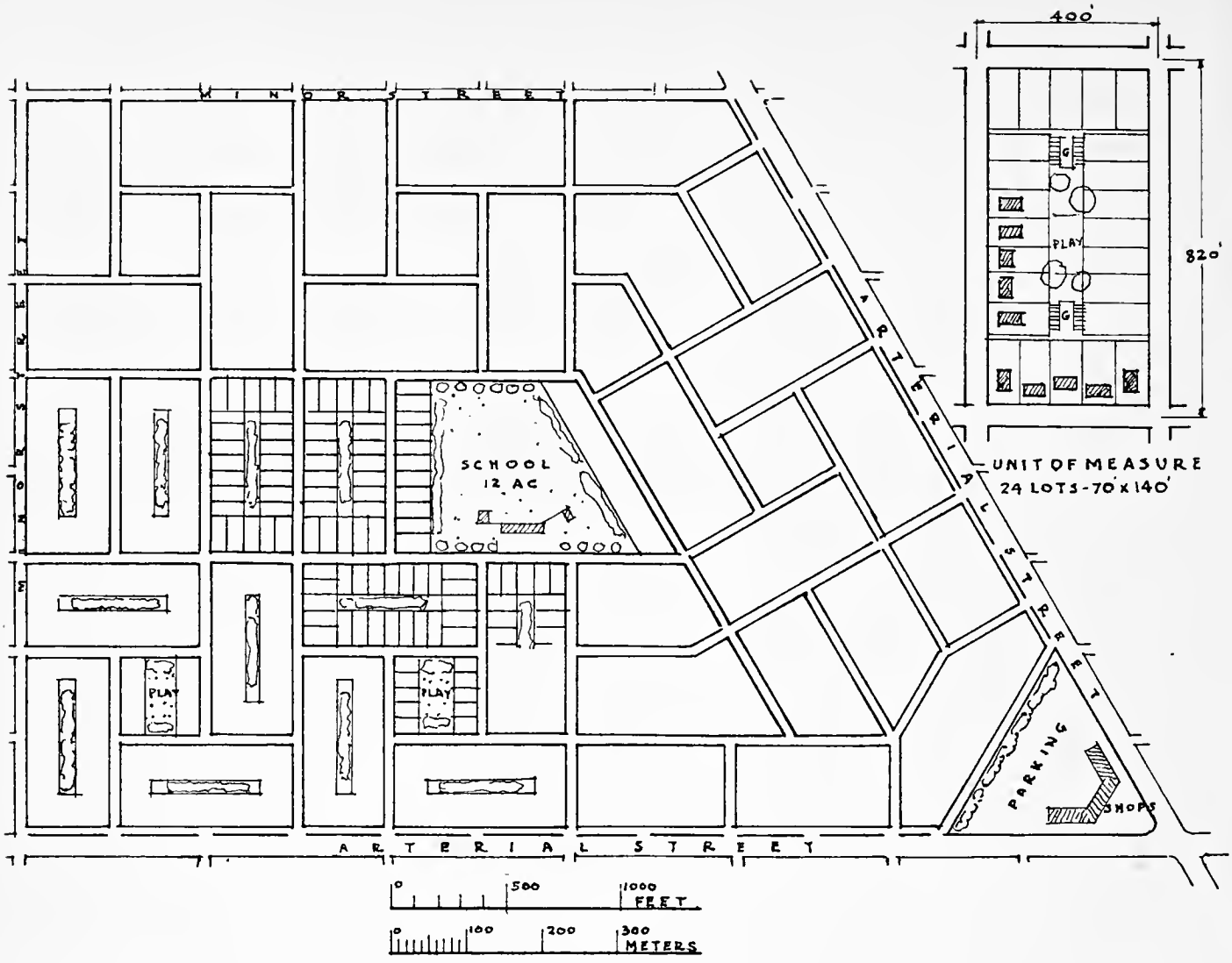
Where does the process of site planning start? Back of every site plan is a unit of measure, whether the project is large or small. This unit is determined by the type and size of the dwelling unit, the rental level, the density of development assumed, whether or not each family is to have private outdoor space, what provisions are to be made for autos, managerial and public services, the character of the surrounding area, which may indicate an introverted or an extroverted solution, and other similar factors. Once this unit of measure is settled, site planning can proceed, following directrices determined by the site itself, existing streets and roads, topography, exposures, outlooks, etc.

For a small site the directrix may be a street frontage; for an urban site, the boundary streets; on rural or suburban sites, an existing road or a logical location of a principal road to be constructed. Of course there are many methods of site planning and no initial theory of layout can carry the process further than a first study without a reappraisal of the method itself, and a careful analysis of the results it has produced up to this point.

Figure 166. A large-scale project with service drives. Eliel and Eero Saarinen and J. Robert Swanson, architects; Edward H. Laird, landscape architect.


PARK'G
ROAD
S. DR.
P
ROAD
PARK'G
ROAD
S. DR.
P
ROAD
S. DR.
COMMUN. BLDG
SCHOOL
S. DR.
P
S. DR.
ROAD
PLAY GROUND
ROAD
PARK'G
S. DR.
ROAD
P
S. DR.
S. DR.
S. DR.
PARK'G
S. DR. - SERVICE DRIVE
P - MINOR PLAY AREA
0
100
200
300
FEET
0
30
60
90
METERS

661



One of the most frequent methods used where the site is bounded by existing streets is what may be called the "perimetrical method." The unit of measure is applied around the boundary of the site and the remaining interior land then divided following the same pattern. In Figures 167 and 168 a 300-acre site has been assumed. In 167 it is subdivided into blocks 400 feet by 800 feet; in 168 an introverted development of culs-de-sac and greenways has been adopted as a unit of measure. These are first sketches; they show the maximum possible development with the assumed unit; at best, they are inhuman. At this point the architect must start pulling his first idea to pieces. How can he rid the plan of its monotony? Only one type of building and one basic grouping has been shown; should there

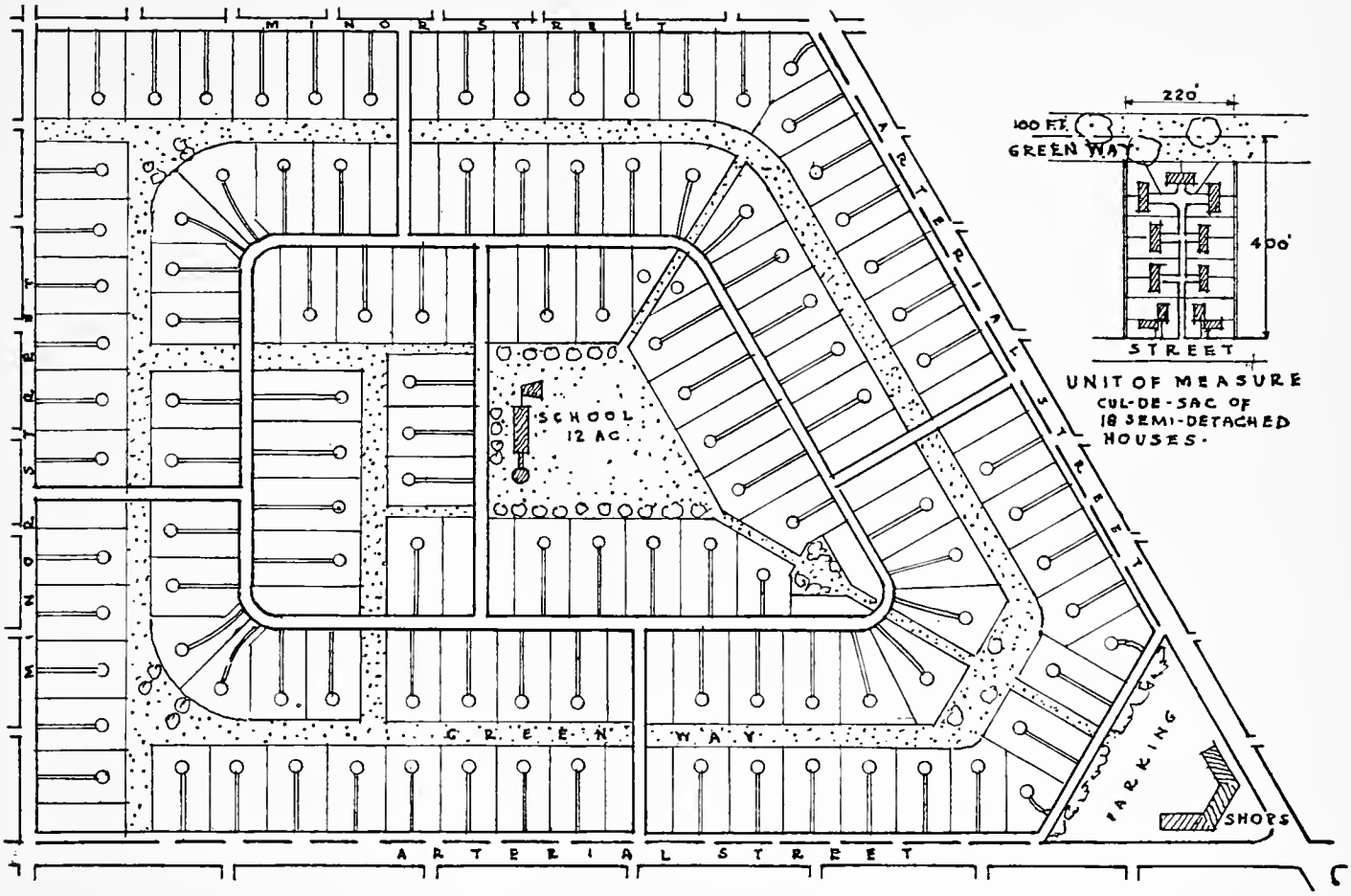
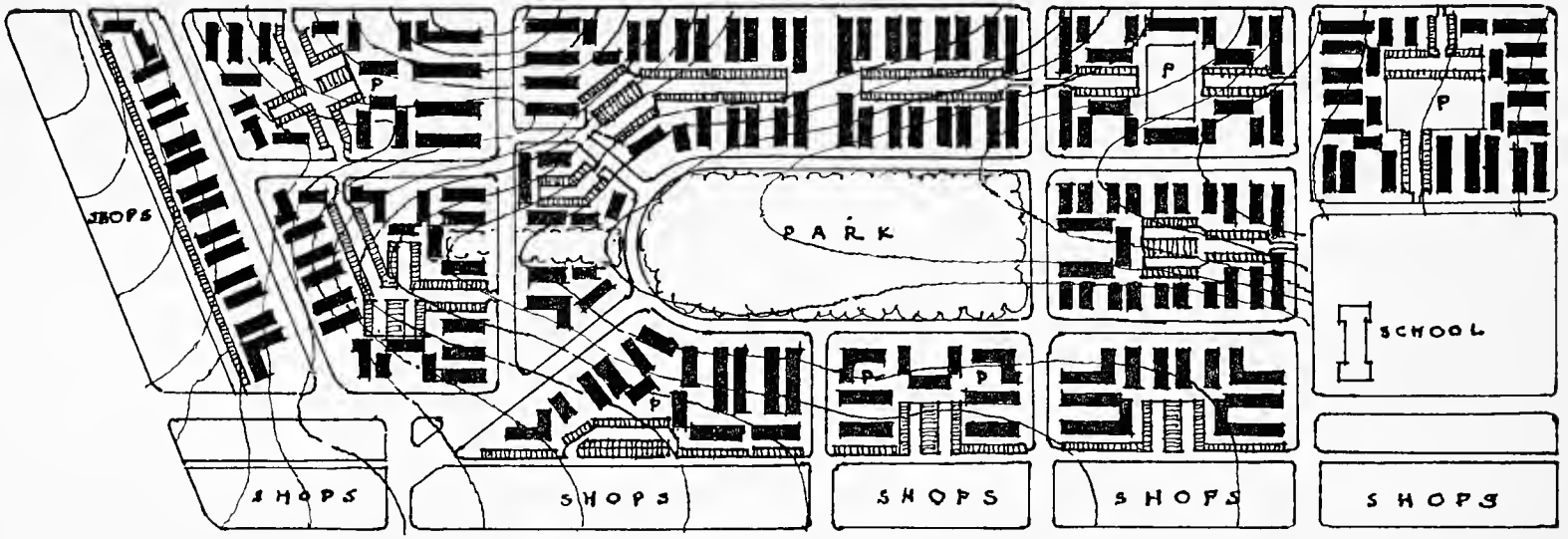


Figure 167 (opposite page). First studies for a 300-acre urban site for individual homes with street frontages. Figure 168 (above). Superblocks with culs-de-sac.

be others? Should there be apartments, high or low, and where should they be located? Is the circulation simple and direct? Is the traffic on the interior loop road in 168 likely to be too heavy? Can children get to school directly and safely? How do occupants of the more remote sections of the development go on foot to the shops? How much has the architect cheated in dimensions in making his first layout? (We all do.) In following his critical thinking through successive studies he may find that the plan finally adopted is nothing like the first try; even the basic concept of the initial scheme may be changed. A first sketch is then merely the entrance door from idea to reality.

Figure 169 was prepared to illustrate this process. It shows an



CONTOUR INTERVAL- 2FT
P = MINOR PLAY AREA
GARAGES

0 200 400 600 FEET

0 50 100 150 METERS

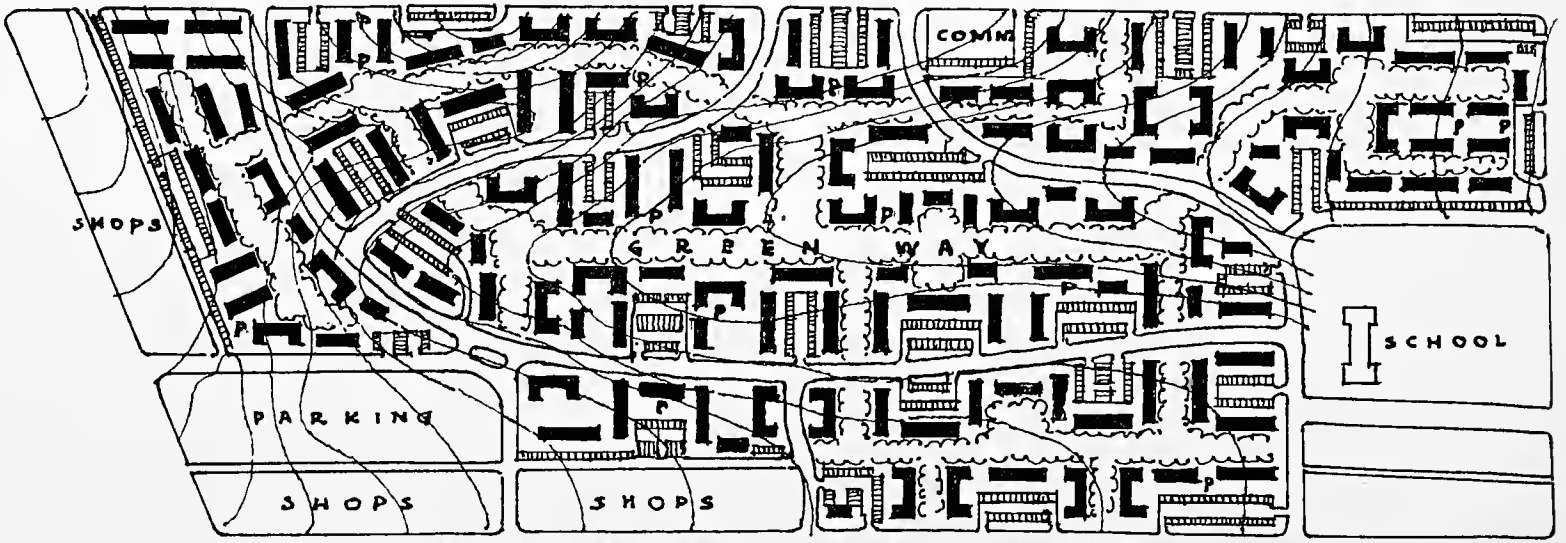


Figure 169. An early study (far left) and the final scheme (left) for Wyvernwood, Los Angeles, California. David J. Witmer, Loyall F. Watson, and Lowell W. Pidgeon, architects.

early study and the final scheme of a 79-acre rental project, comprising 1100 dwelling units. The first of these may be considered a quantity layout. Critical analysis determined the following objectives of further study:

1. To obtain a wider spacing of buildings.
2. To eliminate un-needed roadways—the final plan has six blocks instead of eleven.
3. To plan required through streets to retard the speed of traffic.
4. To distribute the green spaces so that all buildings would have a garden setting.
5. To develop the roads as traffic and service ways, with the dwellings facing the green areas.
6. To extend part of the residential area to the boulevard which is an important traffic highway. This was done because it was felt that the original plan had excessive shop space and because a view of the project from the boulevard would be a rental asset.
7. To obtain a better distribution of minor play areas.

The following pages contain a few additional examples of good site plans with brief comments on each.

Figure 170. Believe it or not, these are one and two story row houses and two story twin houses! What a contrast with the ordinary development of these types of dwelling! This photo of the model gives promise of an environment of considerable interest and charm, a welcome relief from the unimaginative product of the average speculative builder. Public housing project, Pacoima, Los Angeles, California. Arthur B. Gallion and Victor Gruen, architects; Francis Dean, landscape architect.

Figure 171. A bird's eye view of the project shown in Figure 144. Both row houses and apartments are included in the group. Row houses have private gardens separated by alternate hedge rows and wire fences. At a few points the spaces between buildings are a bit narrow; nevertheless, a high degree of privacy and amenity has been achieved, especially in the area surrounding the wooded ravine. Falkland Properties, Silver Spring, Maryland. Louis Justement, architect.

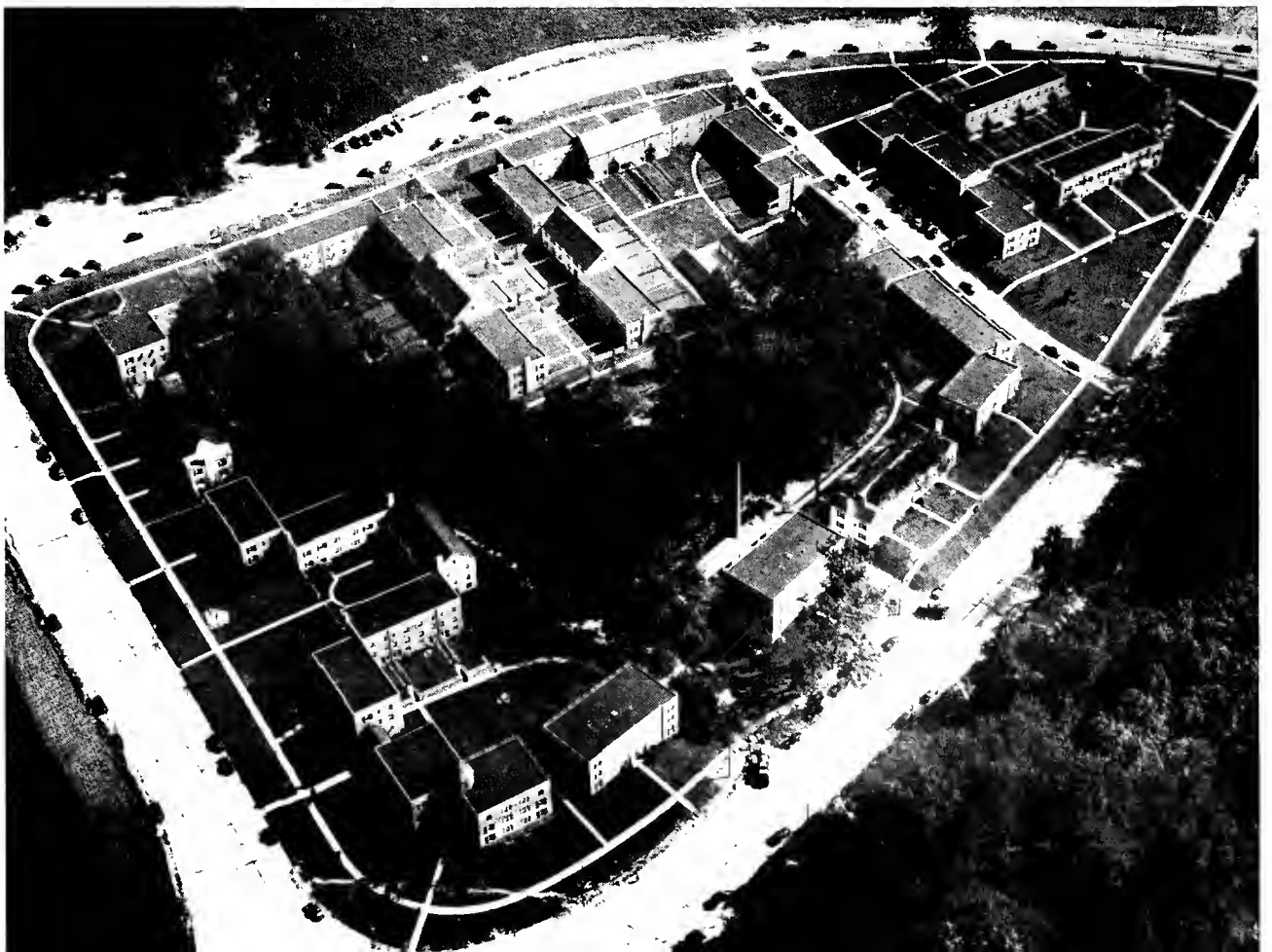


Figure 172. This air view shows clearly the degree in which a large scale housing development can be made self protective and can create its own neighborhood, regardless of its surroundings. Wyvernwood, Los Angeles, California. David J. Witmer, Loyall F. Watson, and Lowell W. Pidgeon, architects; Hammond Sadler, landscape architect. Spence Air Photos.

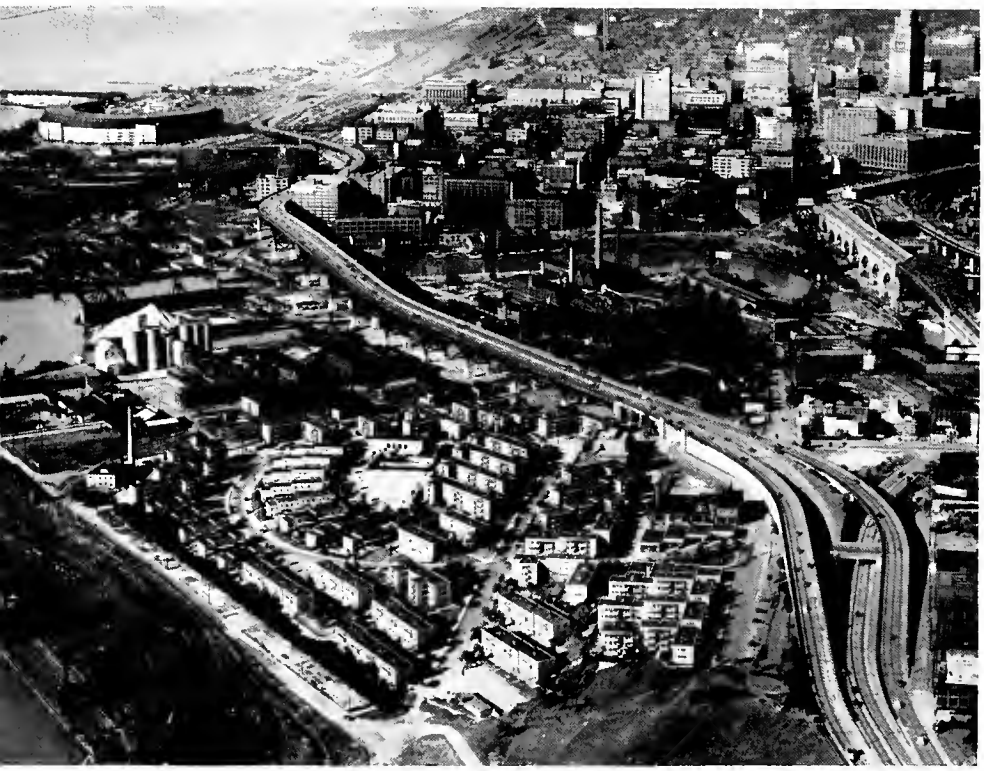


Figure 173. This hilly site lies, as it were, between the Devil and the deep blue sea. It is surrounded by a traffic artery, railroad tracks, and an industrial area. The planning has been handled with great skill, taking maximum advantage of the view of Lake Erie across the tracks. In most cases the ends of building groups face the adjacent adverse uses; the view of the tracks is screened and the noise of the trains mitigated by a dense planting of trees. This is one of the first and perhaps one of the best public housing projects in the country. Lakeview Terrace, Cleveland, Ohio. Joseph L. Weinberg, William H. Conrad, and Wallace G. Teare, architects; Frederick Bigger, planning consultant; Alexander & Strong, landscape architects. Butler Air Survey Co.

Figure 174. A development of 979 dwelling units erected to house workers in the war industries at Newport News, Va. The site adjoins Chesapeake Bay. The roughly triangular area at the water front contains 501 rental dwellings. The remainder of the developed area is occupied by single family homes for sale. In the entire scheme through traffic has been limited to a few streets; both sections are good of their kind. It will be evident at once that the land development costs per unit of the 478 houses for sale is considerably greater than for the 501 rental units. The tabulation to the right will be of interest. This is not a preachment against single family homes; most people prefer them. It does emphasize the point that new and better methods of land subdivision must be devised which will greatly reduce the differential in cost. Stuart Gardens, Newport News, Virginia. William N. Denton, Jr., architect.

	Detached Houses	Group Houses
Land per dwelling unit	8628 sq. ft.	4894 sq. ft.
Families per gross acre	5.1	8.9
Area of pavement per family	1269 sq. ft.	403 sq. ft.
Public sidewalks per family	71.3 ft.	15.6 ft.
Private walks to front and rear entrances per family	110 ft.	80 ft.
Estimated cost of utilities per family (1941)	$318	$170

Figure 175. Three thousand families housed on the site of a former golf club at an average density of 17 families per acre. With shopping (upper left), school (lower right), and other community features, this project is a complete neighborhood. The road pattern divides the lower buildings into smaller groupings in which traffic flow is frequently interrupted for safety. The manner in which street vistas have been handled is worthy of note. Even where the pattern of buildings is symmetrical, there is no feeling of forced effect. It is interesting that parts of the surrounding gridiron pattern have been continued and other streets dead-ended. Fresh Meadows, Queens, New York. Voorhees, Walker, Foley & Smith, architects; Alfred Geiffert, Jr., landscape architect.

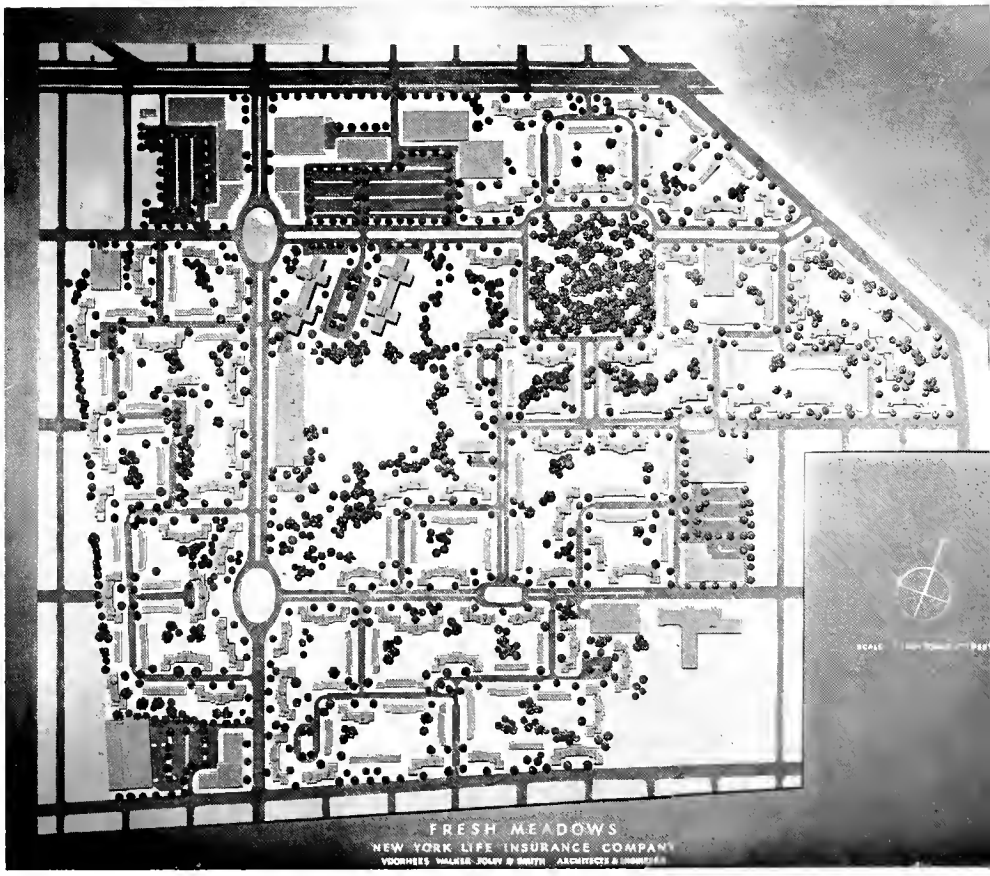


Figure 176. A good example of a small play area with spray pool. The space is large enough to permit dry play of certain kinds: roller skating, velocipedes, etc. Simon Bright Homes, Kinston, North Carolina. A. Mitchell Wooten, architect; John J. Rowland, associate architect.

Figure 177. Play area, Harlem River Houses, New York. Archibald M. Brown (chairman), Horace Ginsbern, Charles F. Fuller, Richard W. Buckley, John Lewis Wilson, Frank Forster, and Will Rice Amon, architects.

Figure 179. Lakeview Terrace, Cleveland, Ohio. Kindergarten wing of Community Building. Joseph L. Weinberg, William H. Conrad, and Wallace C. Teare, architects.

Figure 178 (opposite page). Play area, Amsterdam Houses, New York. Grosvenor Atterbury, Harvey W. Corbett, and Arthur C. Holden, architects; Clark, Rapuano & Holleran,, landscape architects. Courtesy of New York City Housing Authority.

Figure 180. A spray pool at edge of playground near the Community Building, making supervision easy. Apparently the surface is not sufficiently dished to prevent irregular spread of water. "Eastlake," Wilmington, Delaware. G. Morris Whiteside, architect.

Many projects include facilities for common use in addition to the dwelling units and necessary service elements. Their inclusion is justified if they are a needed addition to the private premises of families because they permit normal activities which are impossible within the confines of family quarters. They are not invariably necessary, and if they are included in a housing project, it must be on the basis of a study of the way of life of the presumed occupancy.

If, for instance, an apartment building will have a tenancy consisting largely of adults, more particularly those who seek city living for the sake of anonymity and complete privacy, there is little occasion for social rooms. If, however, the dwelling units are "efficiency" apartments and the building a large one, it may be desirable to provide some such space which can be rented on occasions to those pigeonhole dwellers who want to give large parties which cannot fit into their one-and-a-half rooms.

For adults, outdoor sitting space for relaxation or enjoying sunshine is a frequent requirement. In apartments, this may be either on private balconies, on the roof, or on the grounds (if any) surrounding the building. This need is met for the non-gregarious if the dwelling is a separate house, a semi-detached house, or a row house with adequate yard space. For projects accommodating low-income families, especially in communities where the population is migratory rather than deeply rooted, it is well to have common outdoor sitting areas, since these people need easy contact with others to have some sense of belonging where they are. Hence not only sitting space, but community buildings containing social, recreational, and craft rooms may be entirely in order.

The needs of social life of children outside their homes are the prime motivation of common project facilities. As soon as children are out of their baby buggies, they begin to seek association with others. With increasing age, play groups become larger. Hence a project of considerable size should afford opportunities for common play of children, at least up to the age when they can be trusted to go alone to larger city recreational areas. Major playgrounds, playfields, specialized athletic fields, and stadia are the city's job, but the sandbox, the spray pool, the minor play area, and the small play lot may properly be included within the housing project.

The minor play area is perhaps the most important of these. The United States Housing Authority recommended that they be from 30 to 50 feet square.* It is advisable to have such areas distributed at fairly short intervals throughout a project, even though this may cause a greater maintenance expense than would fewer and larger areas. Children up to six

*_Planning the Site_, U. S. H. A. Bulletin No. 11, U. S. Gov't. Printing Office, 1939.

years of age should play near their homes so that mothers may keep an eye on them or at least be reasonably near at hand.

How many children are there likely to be in a housing project? This will vary depending on the type of occupancy and its economic status. The U. S. Housing Authority assumed that for every 50 families there would be 25 to 30 children between baby carriage age and six years. It recommended an allowance of forty to fifty square feet of play area per child. This seems reasonable, but in a given instance it would be well to make further inquiry as to the probable number of children.

Every play area is likely to be noisy. In all but the smallest areas the consequent nuisance should be mitigated by some physical means: facing the ends of buildings toward the source of noise, or screen planting. Where play is located near any possible source of danger (roads, parking areas, etc.) the area should be enclosed by hedging or fencing.

Minor play areas are not intended for active games like baseball; the principal requirements are a soft-surface play area, a sandbox, a hard-surfaced area with benches for mothers, shade, and screening (see Figure 181). In the diagram shown here is a protective hedge along one path, assumed to be the major walkway. Figures 182 and 183 show three minor play area sites and one play lot site. From the point of view of parental supervision, Figure 182-B is the best since mothers can see their children without going outdoors.

The play lot is an intermediate type of area, permitting both active and quiet play. In the diagram in Figure 181 the play of small children is separated from that of older boys and girls and adults. Benches are located outside the enclosing fence. This seems logical since types of activity planned for small children indicate the possibility of professionally directed play.

The playground As distinguished from the minor play area and the playlot, the playground affords a larger measure of opportunity for adult play. In the absence of city playgrounds it may be necessary to include a playground in a housing project. Obviously the playground requires a larger area per person than the smaller units; softball needs more space per player than London Bridge. The National Recreation Association recommends an allowance of $3\frac{1}{2}$ acres for a population of 2000. In public housing projects it might be well to locate any large playground at the perimeter of the project. There are two reasons for this: first, the playground has been built because there is none available in the immediate neighborhood; it is public property and cannot be effectively restricted to use by the occupants of the project; hence it should be available to outsiders without their passing through the residential area; second, as noted, a playground is a city responsibility, and if the time comes when the city

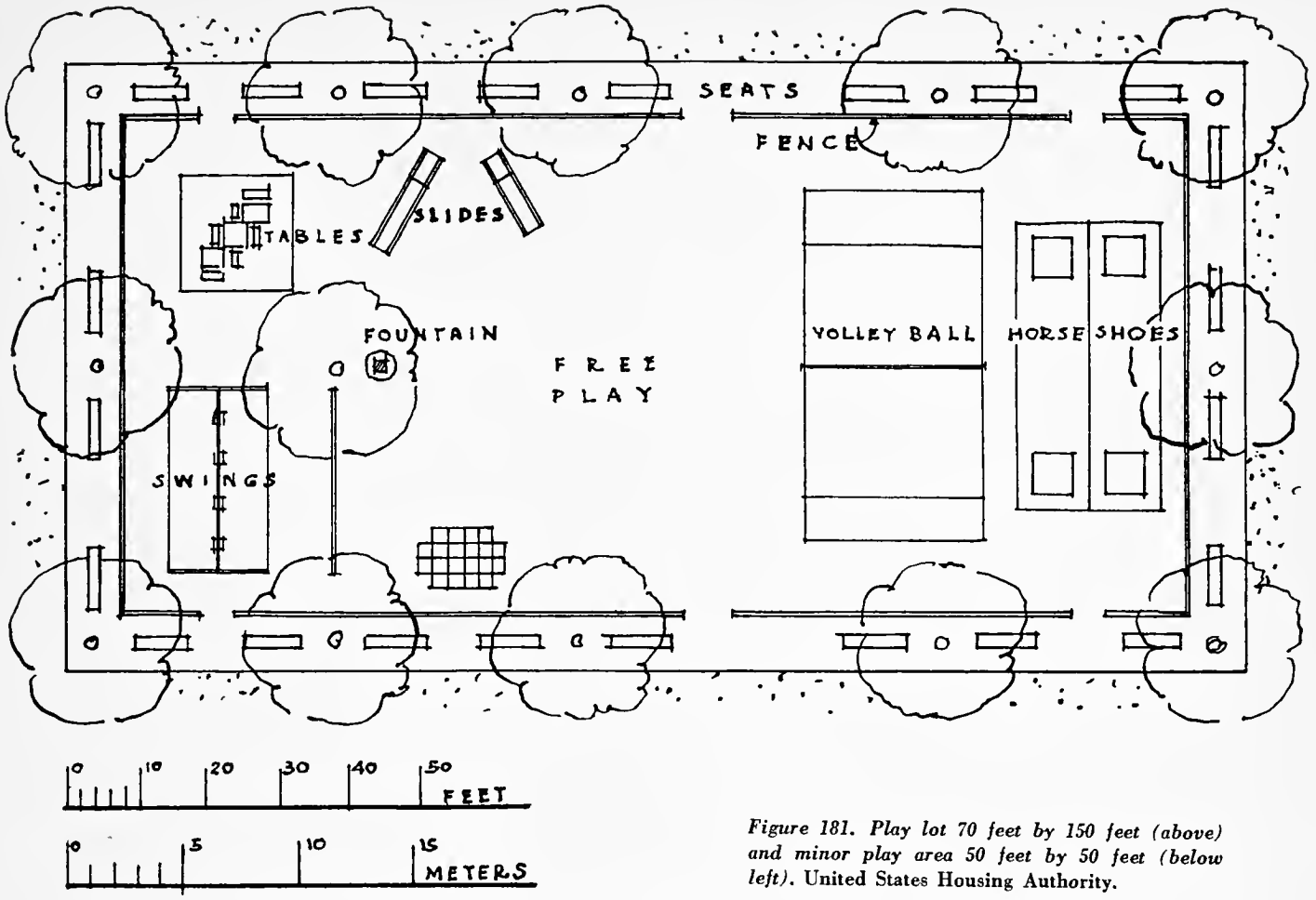
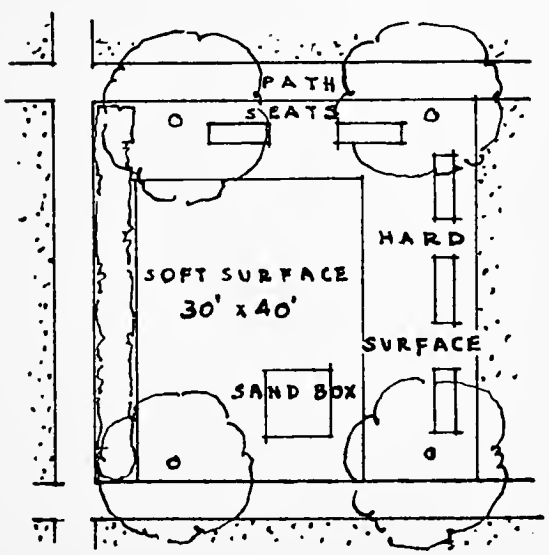


Figure 181. Play lot 70 feet by 150 feet (above) and minor play area 50 feet by 50 feet (below left). United States Housing Authority.



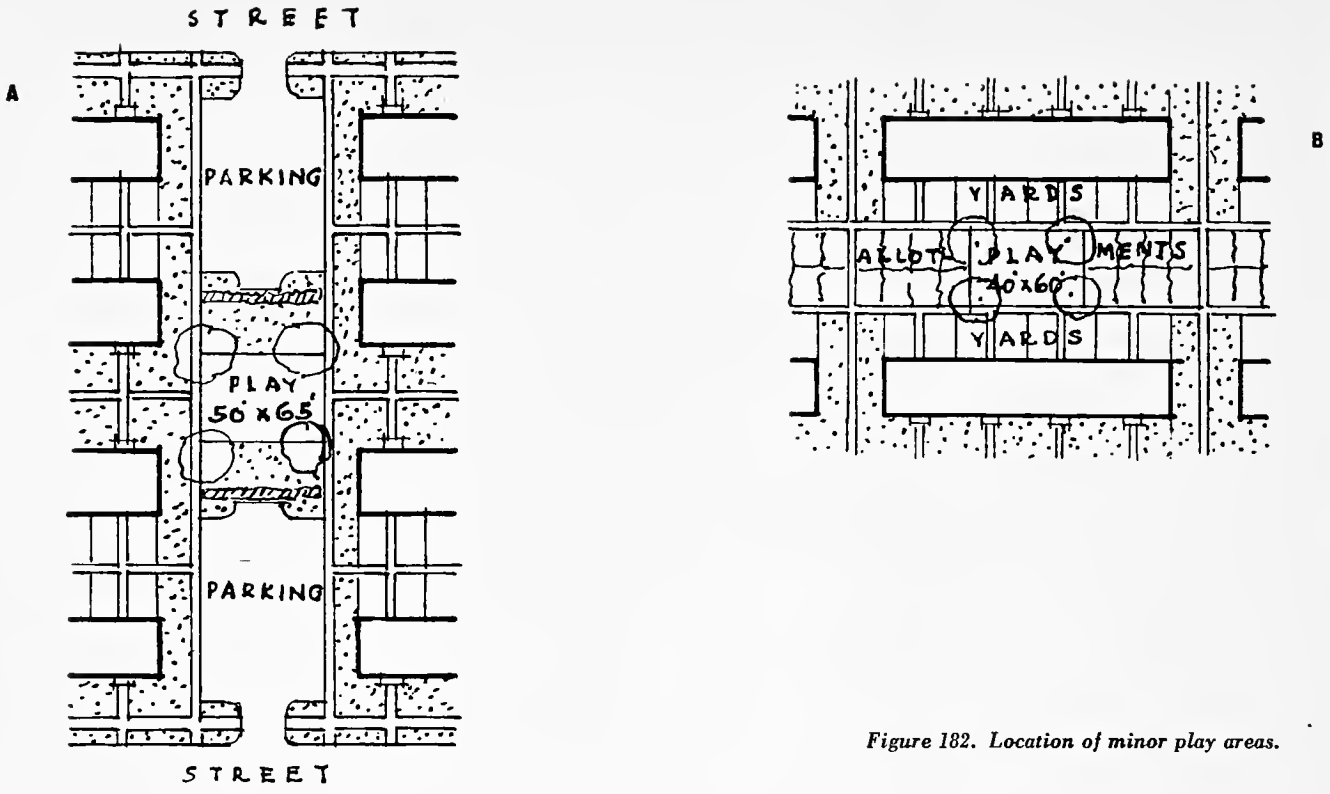


Figure 182. Location of minor play areas.

recreation budget permits its acquisition and operation, title can readily be transferred without affecting the remainder of the project.

Equipment A certain amount of equipment is necessary in every play area, be it only a sandbox and benches. Equipment requires repair and in large projects may need considerable storage space. Slides, swings and jungle gyms are familiar items found in most play areas. In some measure they are being superseded by other forms which give the same opportunities for exercise but which also stimulate the imagination. Of this type are sewer pipe tunnels, wall sections, wooden rails on timber sleepers, and above all, play sculpture; when cleverly designed, it provides all sorts of delight for young fry.

Water play Kids love to mess around in water. Every project comprising more than thirty or forty dwelling units should have some spot where children can enjoy a spray shower in summer and, if possible, a wading pool. For obvious reasons these should not be located within thirty feet of a dwelling. Shade and benches are advisable. An excellent example of a spray shower is shown in Figure 176.

However desirable they may be, it is not advisable to include swimming pools for adults in the average housing project. They are expensive

to construct, require treatment of the water and constant supervision when in use to keep little children out of danger.

The community house It would be pointless to discuss in detail the design of community houses, since every project has its indicated program (see Figures 179 and 180). A community house should be near the principal recreation area of the project for purposes of supervision and should house the administrative offices. Changing needs may require additional space; hence space should be allowed for enlargement of the original building without impinging on the areas allocated for other purposes.

The community house is also the center of project personnel; locker rooms and toilets should be provided, and storage of materials and vehicles should be nearby.

Every meeting or social room should be susceptible to multiple use where possible. There are exceptions; craft rooms containing machinery and likely to be cluttered with unfinished work will hardly serve for games or meetings.

The needs of the tenancy of a project may require a day nursery to relieve working mothers of part of their burden. It should be remembered that day nurseries and nursery schools are likely to stop functioning when there is an epidemic of measles.

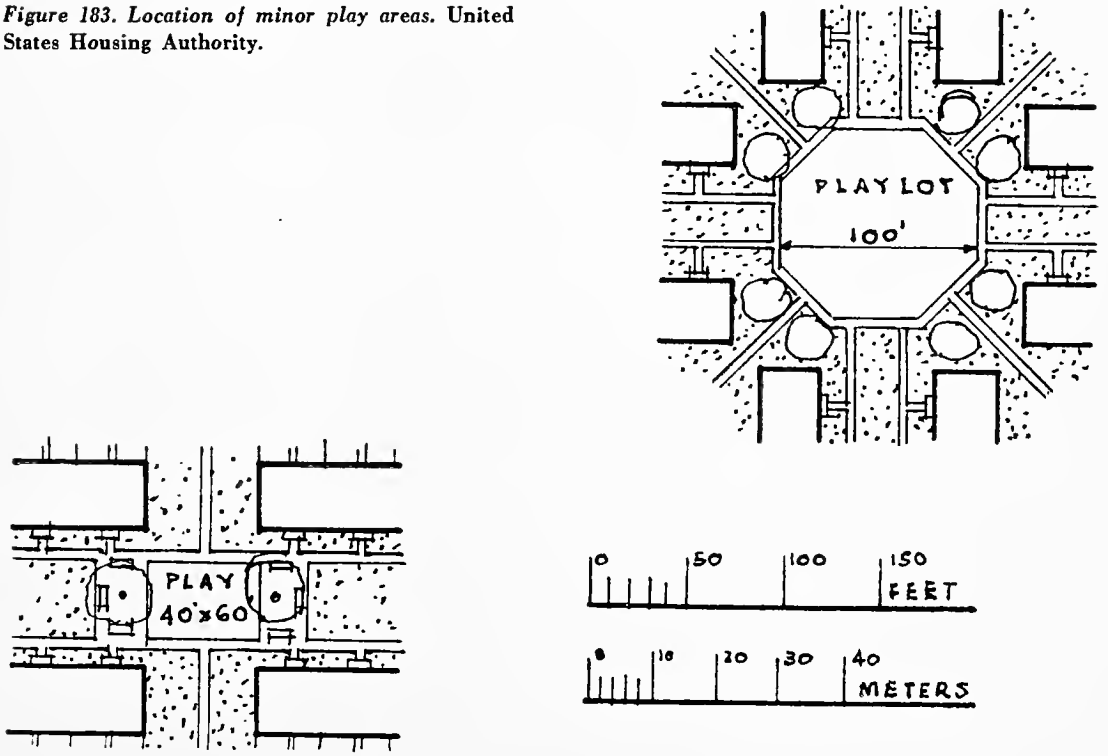


Figure 183. Location of minor play areas. United States Housing Authority.

Parking and Garages

The parking needs of housing projects are an important element of the overall problem of traffic congestion of any community. Their needs comprise parking and auto storage for the occupants, parking for visitors and for delivery wagons. The public streets are entirely inadequate for this purpose. As an example, let us assume a project of 80 families, of which 60 own cars. Twenty-two feet should be allowed for a car, to which must be added an allowance for space at fire hydrants, clearance at street corners and drives, which would bring the total to about thirty feet per car. Sixty cars would require 1800 feet of street frontage. What are the chances that an 80-family development will have that much curb space? Of course in subdivisions having lots sixty feet or more in width, there is room at the curb for the family car and space for one visitor, with a good allowance for the garage driveway, but for apartments the frontage will almost always be inadequate. The eighteen-foot-wide row house will not even care for the family car, to say nothing of those of visitors. Hence there must be provision for off-street parking for most projects. As noted, generous subdivisions are an exception. In densely developed urban areas where land cost makes it economically impossible to store autos on the premises, we must rely on special parking garages, frequently remote from the dwellings and sometimes reaching skyscraper proportions. What proportion of families will have cars? No general assumption can be made. It can be determined only on the basis of local factors: adequacy of transit facilities, average distance of travel to work, climate, and in some measure economic status of the occupants. Thus in public housing projects in Philadelphia, parking space has been provided in the past for 25% of the families, perhaps somewhat scanty. In Los Angeles, where travel distances are great and transit none too good, an off-street space is required for every family housed in apartments.

How much space should be allowed per car? Figure 184 shows the minimal dimensions. If parking a car were invariably done by trained attendants who are sufficiently slim, the allowances might be reduced as they are in large public garages, but the average car owner is none too careful to keep between the white lines and allow operating space for the next person who comes along. Formerly eight feet in width for diagonal and right angle parking was considered adequate, but since the introduction of the canal boat shape for cars, the door hinges are six to seven inches farther out than formerly and nine feet is necessary to avoid mutilation of cars and the

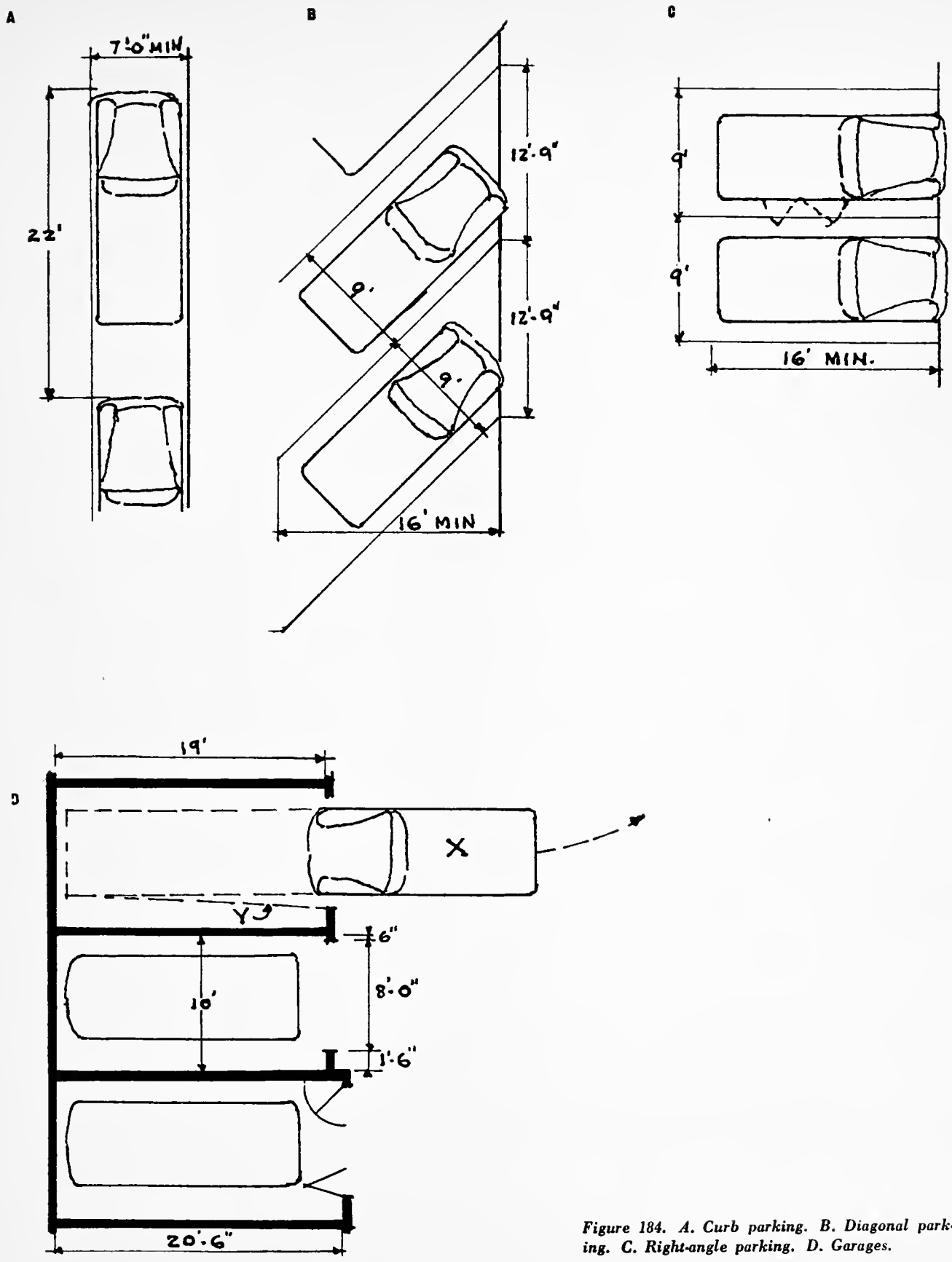


Figure 184. A. Curb parking. B. Diagonal parking. C. Right-angle parking. D. Garages.

consequent exchange of registration and insurance information.

At present there is a tendency to omit closed garages and rely on open parking spaces or sheds—labeled "carports"! This is partly a matter of cost and in mild dry climates is entirely justifiable. If an area is frequently visited by salty mists or if winter temperatures are low, garages are necessary. Salty dampness will eventually ruin the painted surfaces and pit the chromium plating. In cold climates a garage, even if unheated, is better than none. Although the water may be protected against freezing, the hardening of grease and the thickening of oil tend to damage a car, and winter gales blowing on it increase the likelihood of such damage. Heat for garages should be generated at a remote source. The volatile liquid in the gas tank and an open flame or red hot electric unit are not good companions.

Garages require more space per unit than open parking since the driver of a car must have space to pass along it and outdoors without tearing his clothes on rough spots on the partitions. For this reason the doors should not be centered on the stall but should be nearer the right side as you drive in. British readers should assume the converse position, at least until such time as they mend their ways and keep to the right.

The space between facing garages must be greater than that between the backs of cars in open parking, since in backing out, the car must be about in position X before the wheels can be cut, otherwise the front wheels will take a curve similar to Y and smash the door jamb (see Figure 184-C).

There are five principal types of garage doors in common use.

1. Double doors swinging out are perhaps the most common. They are simple to install and the hardware comparatively inexpensive. On the other hand, they form excellent sails in a high wind and unless carefully braced when open will be ripped off their hinges.

2. Inside doors suspended from a curved track and standing against the side wall when open. They leave the opening clear but are rather heavy and clumsy to operate and sometimes jump the track.

3. Outside sliding doors, a good form except for the fact that they block the neighboring stall and are likely to be wobbly at the bottom.

4. Sectional lift doors. This is a comparatively expensive form of door but easy to operate unless the bottom rail is embedded in ice.

5. Inswinging triple doors require a greater garage depth but are not whipped about by the wind and can be opened readily without removing the foot of snow that fell last night. Hardware and installation are not expensive.

Figures 185 and 186 present necessary widths and clearances for typical parking and turning situations. It will be observed that when the rear wheels of a car follow a track approximately circular, the front wheels seem to have a mind of their own and go their own sweet way. (Note: To

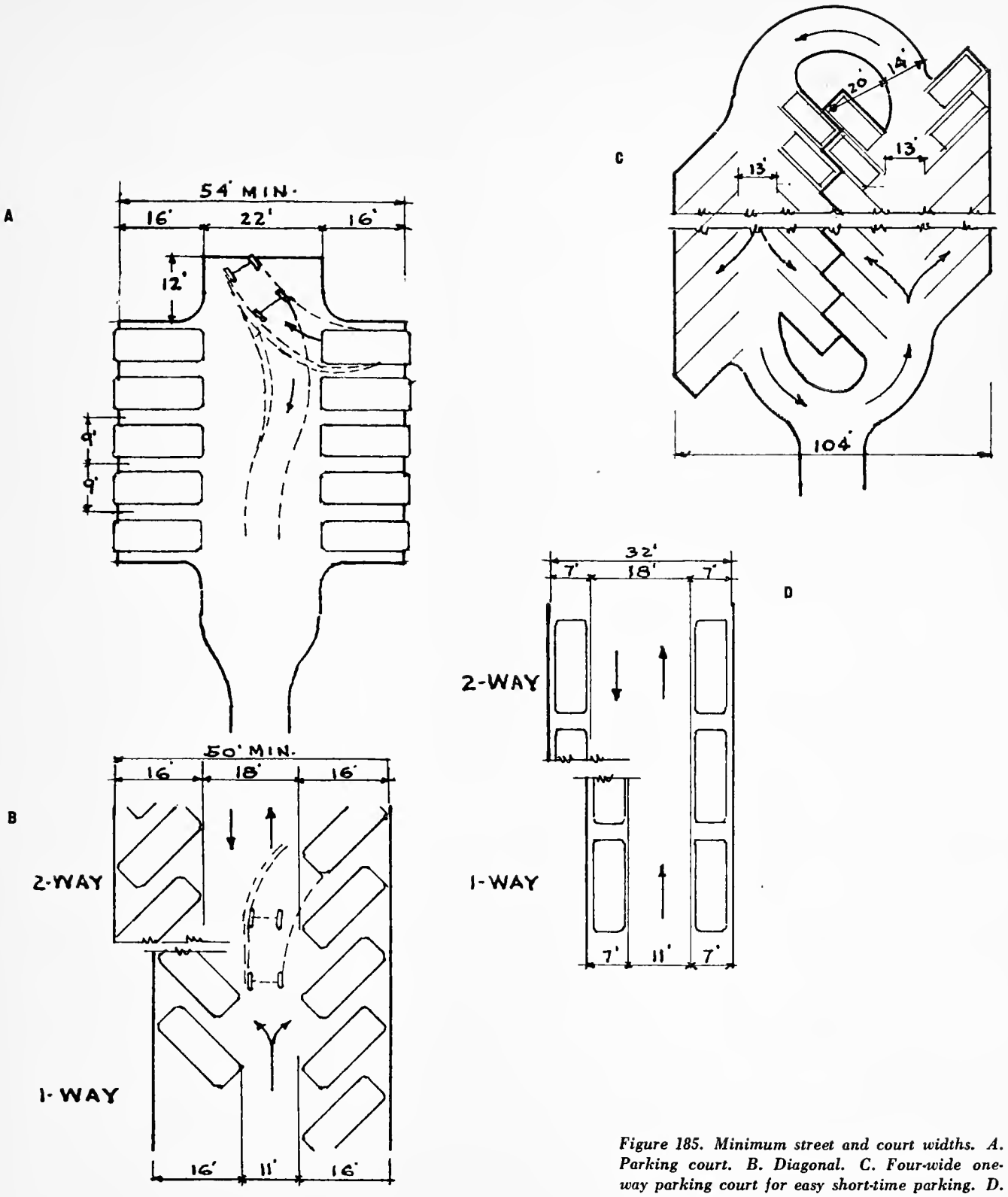


Figure 185. Minimum street and court widths. A. Parking court. B. Diagonal. C. Four-wide one-way parking court for easy short-time parking. D. Street parking at curb.

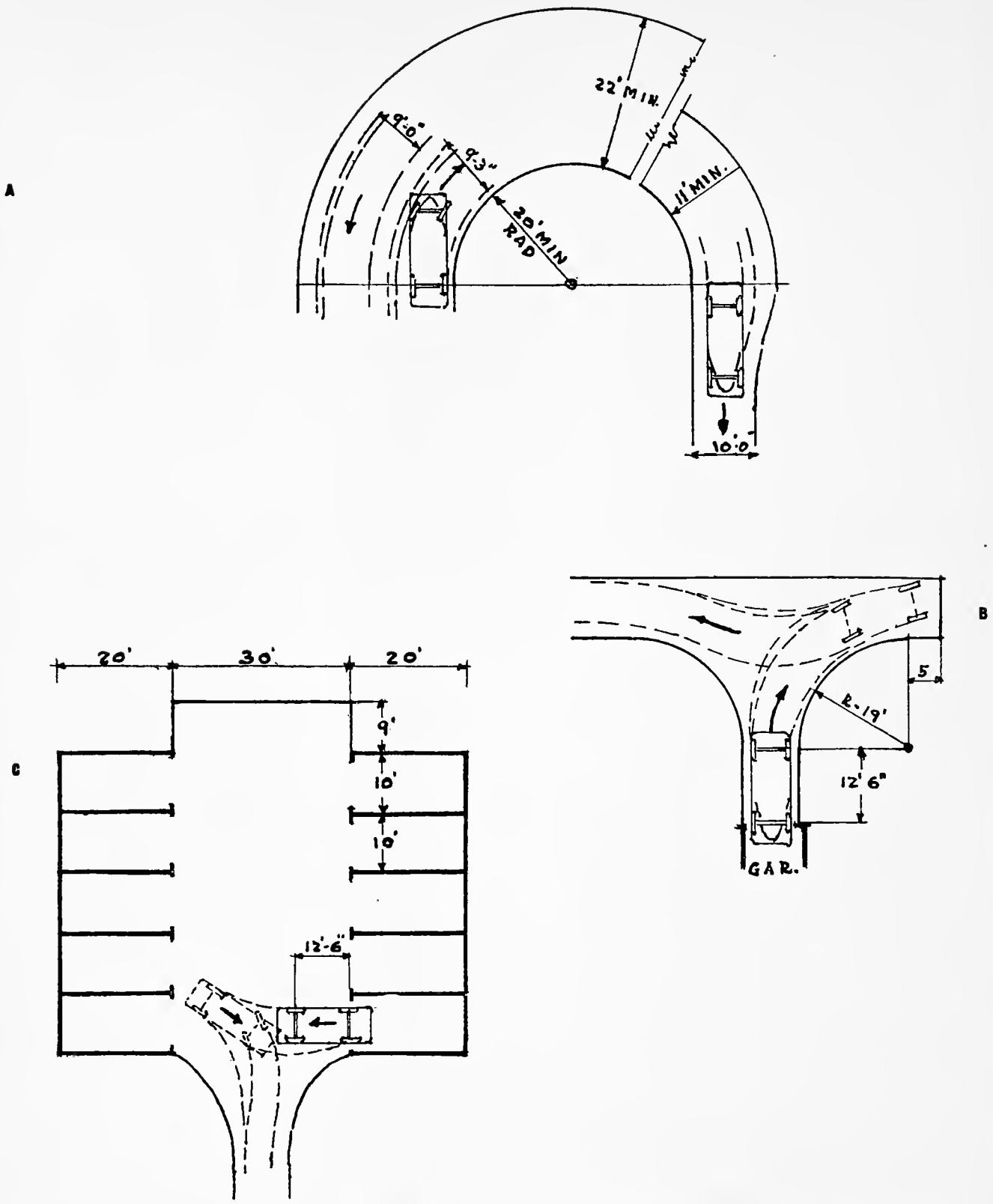


Figure 186. Requirements for turns. A. 180° turns. B. Tee turn out of garage. C. Garage compound.

convert the dimensions to meters, multiply the number of feet by 0.305.)

Mention has been made of the desirability of having parking close to the dwelling because of the bulk and weight of bundles accumulated in shopping. One method of caring for this need is shown in Figure 187-B. Here open parking courts are placed in the middle of a building group which has its kitchen entrances toward the court. In this manner the cars are in close proximity to the dwellings and are screened from view of persons in the garden areas.

If the buildings in a project are all readily accessible from roads, the parking areas or garage compounds may be somewhat more remote, say, 300 feet instead of 150 to 175 feet, as shown in Figure 187-A. The circles have a radius of 250 feet. Tenants' cars are stored at night in garage compounds, and the streets may be presumed to care for temporary tenant parking and for visitors' cars.

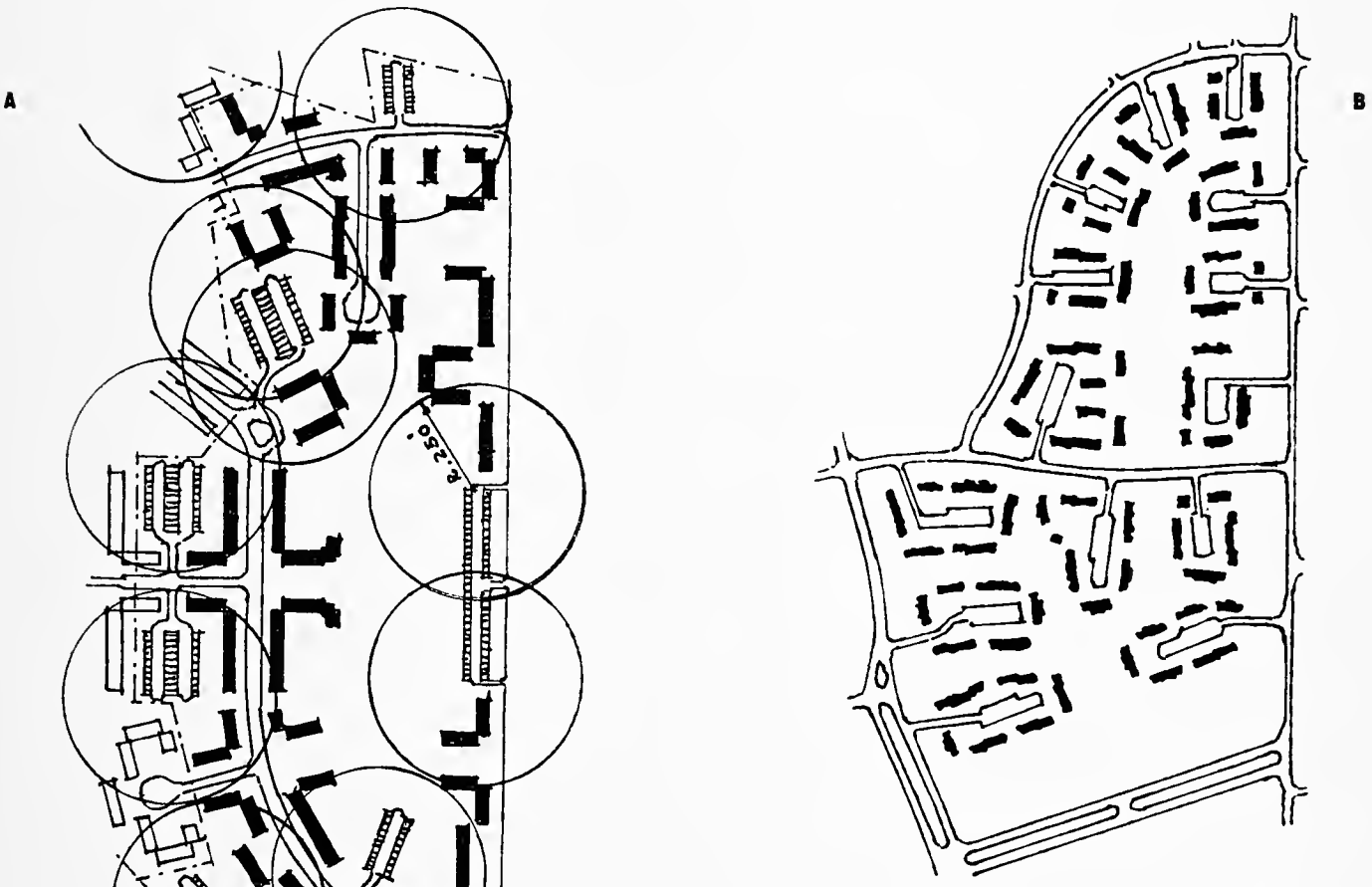


Figure 187. A. Relation of garage compounds to buildings. "Interlaken," Westchester, New York. B. Parking courts surrounded by building groups. Park Forest, Illinois. A: De Young & Moscowitz, architects; Clark & Rapuano, landscape architects. B: Loebl, Schlossman & Bennett, architects; Elbert Peets, town planner.

Figure 188 is a simple and good parking court in close contact with the houses. Garages are provided for 56% of the number of families and the open parking space will accommodate the cars of the remainder, leaving a number of spaces for the convenience of visitors.

In 189-A we find a layout basically like the Radburn culs-de-sac. Here, however, the provisions for autos are much more ample, and with the added parking bays near the street entrance to the group, visitors can park close to the cocktail party they are attending.

Figure 189-B shows that angular corners of a site, unavailable for buildings, can be put to use as a garage compound with some storage place for project vehicles and equipment.

Garages in the basements of row houses were discussed in a previous chapter. Multi-family buildings should not have basement garages unless the latter are completely fireproof, entered either from the outside only or by a fireproof passage in the building, having fireproof self-closing doors at the garage entrance.

Most apartment house basements do not lend themselves readily to the installation of garages. If the building is not more than three stories high, it is feasible to have a line of stalls entered directly from one side of the building, but the problem becomes more difficult if the cars are to be

Figure 189 (opposite page). A. A large parking-garage court with ample space for cars of tenants and visitors. Baldwin Hills, Los Angeles, California. B. Use of an odd corner for garages. A: Reginald D. Johnson and Wilson, Merrill & Alexander, architects; Clarence S. Stein, consulting architect.

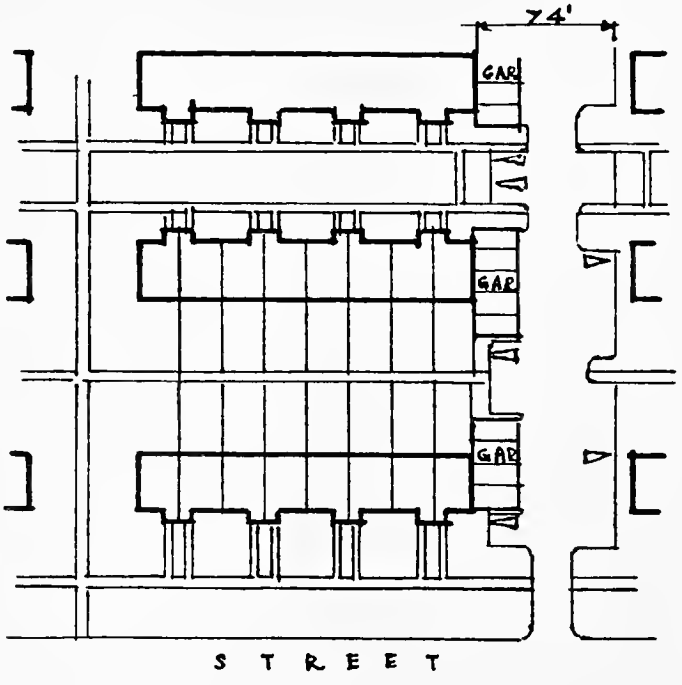
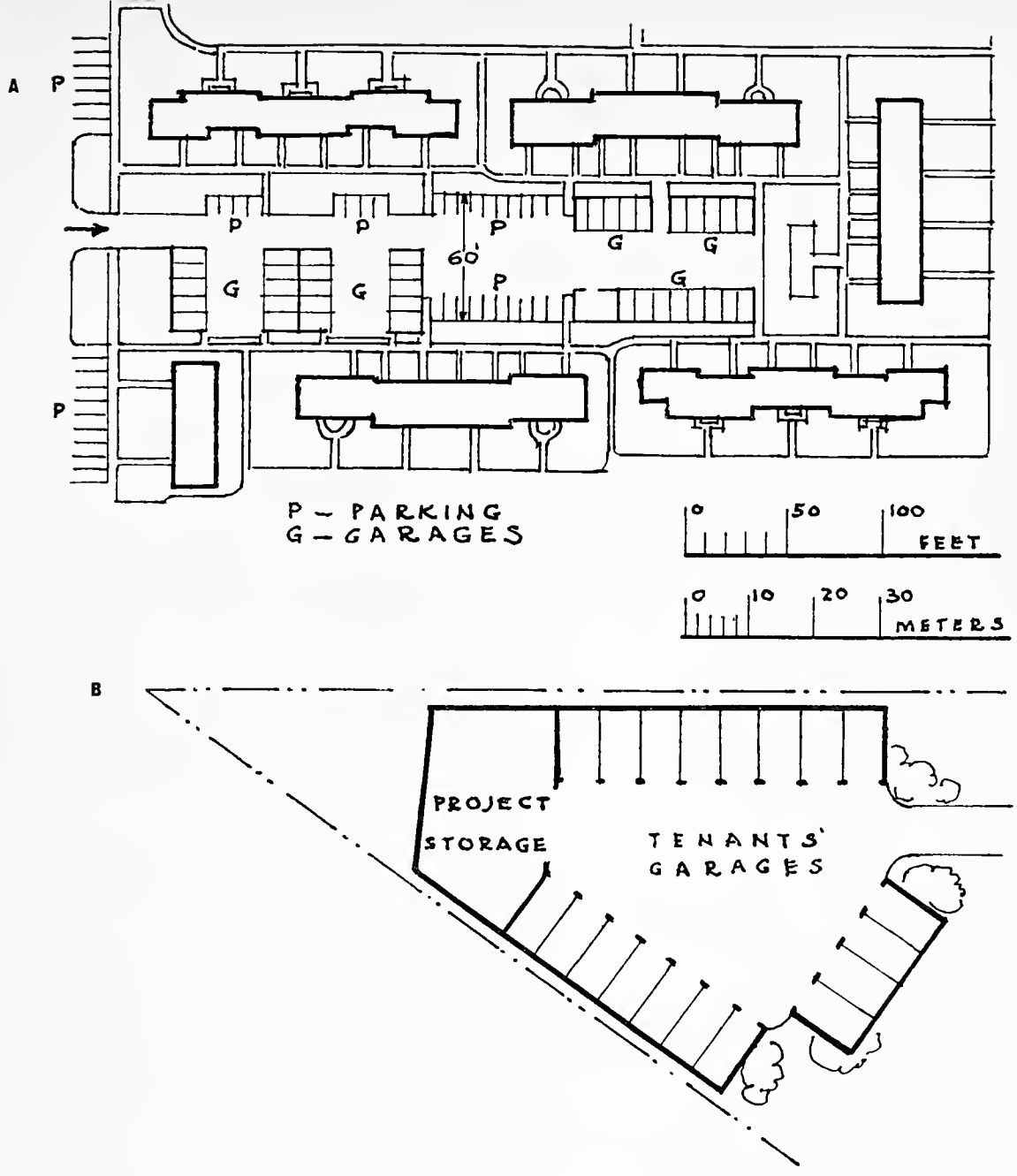


Figure 188. Garages and parking bays at end of buildings. Elbert Peets, town planner.



driven into the building and then parked two sides of traffic aisles. An apartment house wing is seldom more than forty feet across, and a central aisle with cars either side requires at least sixty feet inside the exterior walls. Furthermore, the positions of interior columns in steel or concrete frame buildings are determined for the convenience of the apartments above, not of the cars below; hence a properly arranged basement garage with different column spacing will involve heavy construction costs. Because of the usual tightness of space, trained attendants are necessary to park the autos. All of which means that this type of installation is ordinarily feasible only in buildings commanding very high rentals.

Planting and Paths

The proper planning and planting of the grounds is the element most often neglected in housing developments. Frequently it is treated as an afterthought to be considered only when the buildings are completed and the developer knows how much money will remain for "frills." Even when an allowance for planting has been made in the financial setup, this is the first sum to be reduced if other construction costs exceed estimates.

Planting Planting is not merely a superfluity but is a dollar and cents value in any development; indeed it is the only element which increases in value with time. Sometimes, in dense urban development there just isn't any room for greenery, but in most cases there is a chance to plant trees, shrubs, and grass which contribute much to the livability and desirability of the structures and hence increase their value.

For this reason, the landscape architect is an essential member of the planning team, and he should play his part from the outset. His knowledge of soils, topography, drainage, and plants is necessary to the job. Of course many architects are informed on these subjects and sometimes a conflict of opinion arises. This is all to the good; reasonable professional men can always resolve differences in point of view, but it is the landscape architect's experienced artistry and imagination in creating the landscape picture that is of the highest importance. The architect readily creates the picture of how his buildings will look when completed, the landscape architect must see his planting not as of the day the first tenants move in, when it is almost always scrawny, but as it will appear several years later when the trees and shrubs have grown and may even conceal unfortunate corners in the architect's design.

This is not a treatise on landscape design. There are, however, certain basic facts which architects and developers should know.

1. A proper allowance should be made for land development, grading, walks, retaining walls, etc. Except on difficult terrain, 2% to 3% of the total construction cost will usually suffice.

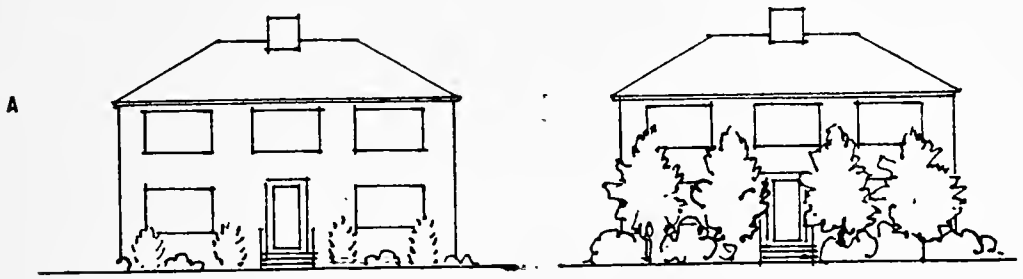
Figure 191. A. Three stories. B. Six stories. C. Fourteen stories.

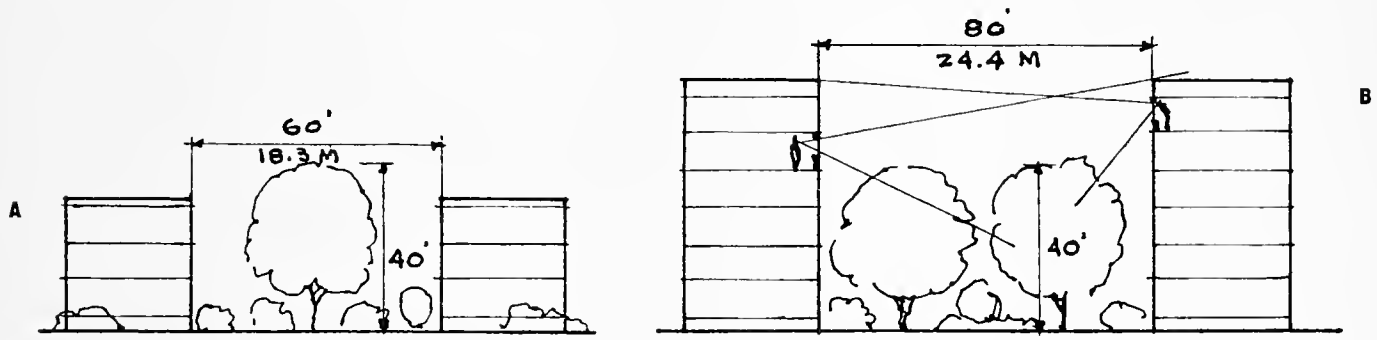
2. The use of native or naturalized plants is better than that of exotics. They cost less, grow better and give the buildings a sense of belonging in their environment.

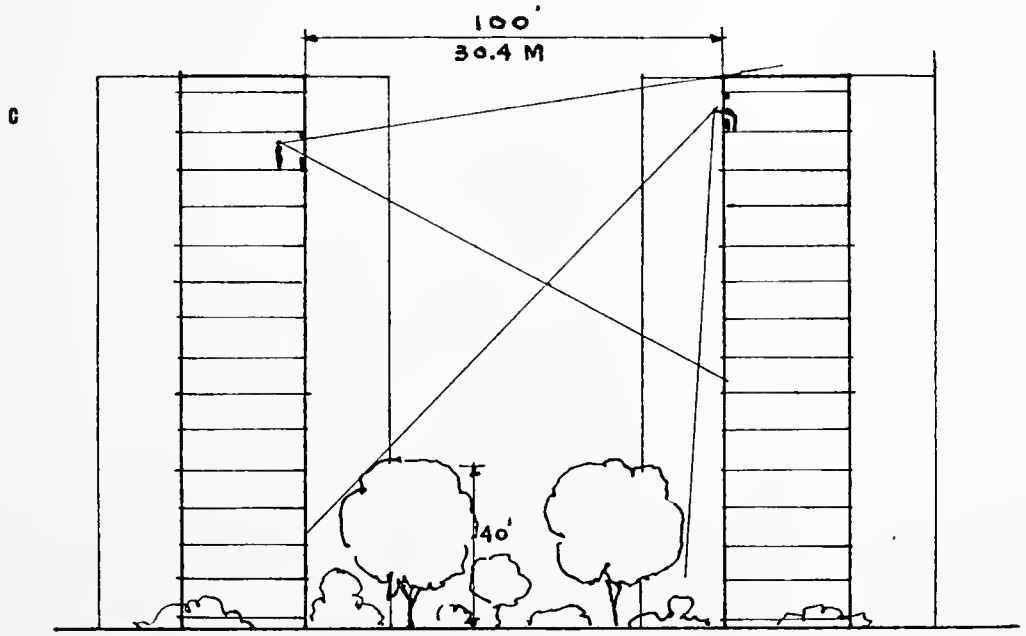
3. Trees and shrubs grow. Forest trees should not be planted as shrubs, and in planting both trees and shrubs, their eventual size must be considered. The four little evergreens planted in front of the house by the

average nurseryman will block the windows before many years have passed (see Figure 190). Shrubs should be kept sufficiently clear of paths to allow for growth. Trees should not be planted under overhead service wires. The butchers often employed by utility companies will hack them to bits to keep the wires clear.

Figure 190. A. What the nurseryman planted. B. A few years later.







4. Deciduous trees should be used where sun is desired in winter and shade in summer; evergreens to protect against wind, screen objectionable views, and deaden noise. Of course, evergreens also give color and warmth to the winter landscape. In smoky cities trees should be selected whose leaves can resist the bad effects of soot and gases.

5. Trees planted should not be mere switches, which will give the place a barren appearance for years. Trees of $3\frac{1}{2}''$ to $4''$ caliper are a good size for the average development of two or three story buildings. For high buildings, $8''$ to $10''$ trees, 30 to 40 feet high, are more in scale. They will be sufficiently large to create attractive street vistas. Of course they cannot afford a garden environment for occupants of the buildings who live above the fourth floor (see Figure 191). Unless their apartments enjoy a distant view, their outlook will be one of masonry walls. This is one of the objections to high buildings.

6. Plants should be so distributed that no view of the structures is devoid of trees and shrubs. Obviously buildings of complicated form, with many courts and corners will require greater expenditure to produce an effect than will simple buildings surrounding a large open space (see Figure 192). Where funds for planting are limited, this problem requires careful study, a job which you'd better shove onto the broad shoulders of a competent landscape architect.

7. It is a mistake to use too many varieties of trees and shrubs, especially if they are flowering. Many shapes and colors create confusion and lack of emphasis and rhythm. A planting should be a symphony, or if very small, at least a pleasant song.

8. Lawn areas should be as large as feasible, small patches of grass are a nuisance; if you have ever pushed a lawnmower, you know why! For the same reasons grassed slopes of more than one to five are to be avoided. They should be planted either with a groundcover or with shrubs of low growing habit.

9. Hedges should be used for specific screening and protective purposes only. They require maintenance and trimming.

10. Vines have taken the curse off many a barracks.

Paths Everybody likes to take a short cut, a fact which should be borne in mind in laying out paths in a housing project. If they are not properly located, bald spots and trails on the lawns will soon tell you where they should have been. Such being the nature of human beings, what can be done about it? Note first that the probability of damage increases directly with the increasing number of persons passing a given point and also with increasing population density. It is more likely at the entrance to a court than at the rear and in 13-story developments than in walk-up projects.

A few methods of meeting the problem are shown in Figure 193.

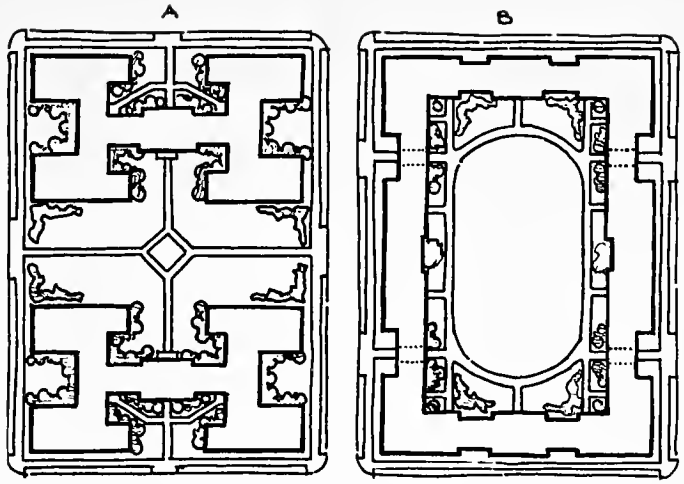


Figure 192. Shrub planting is economical with simple building forms.

A single path between buildings should be used only when the intervening space is comparatively narrow (A). Where two walks are used, as in B, there should be cross connecting walks at intervals, and if the distance between the parallels is considerable, diagonal cross paths may be advisable. At the end of a court giving access to a number of entrances, the main walk should be curved (D).

Intersections of paths should have rounded corners. Right angle corners mean cross cuts unless they are protected by shrubs (E).

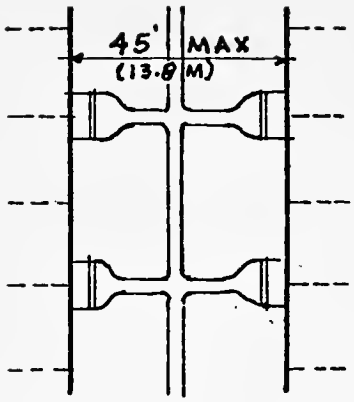
To mitigate annoyance to first floor occupants, paths should be kept a minimum of ten, and preferably fifteen, feet from the wall; the eye-level of the average passer-by should not be higher than the window sill (C).

Main walks should be at least five feet wide, branch walks $3\frac{1}{2}$ to 4 feet, and service walks at least three feet.

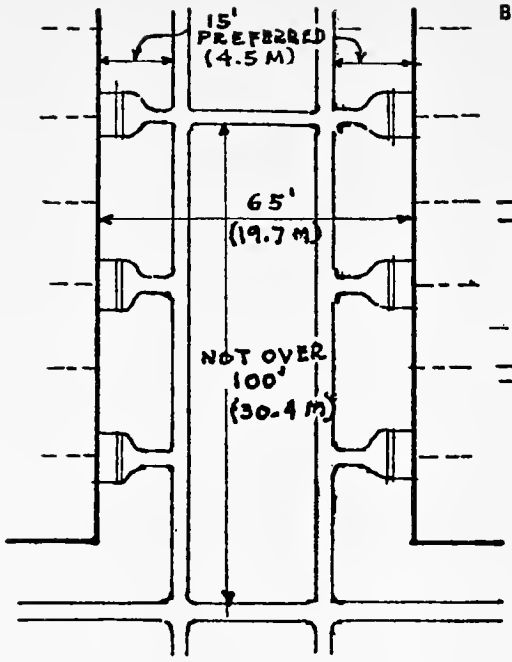
In Figure 194 the sidewalk plan made provision for some short cuts after a study of the origin and destination of pedestrian traffic. This was necessary, since the buildings are five stories high and the population density about 80 families per acre.

One other point to note about layout of walks: they should not be planned in large geometric forms on irregular topography. A circle straddling a humpy ridge of land looks like a roller coaster at Coney Island, which is lots of fun for the kiddies but rather rough on the sensitive eye.

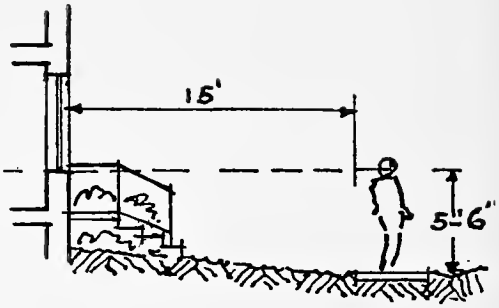
A


45' MAX
(13.8 M)

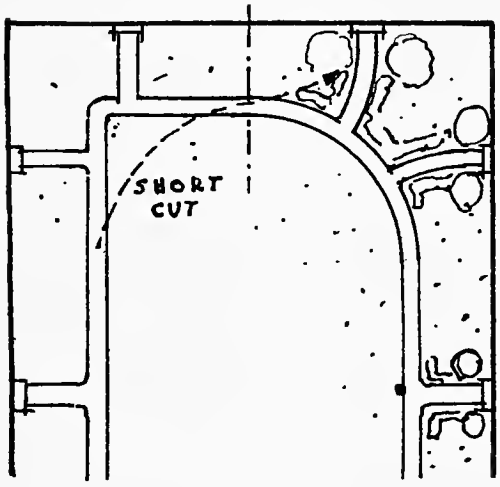
B


15'
PREFERRED
(4.5 M)
65'
(19.7 M)
NOT OVER
100'
(30.4 M)

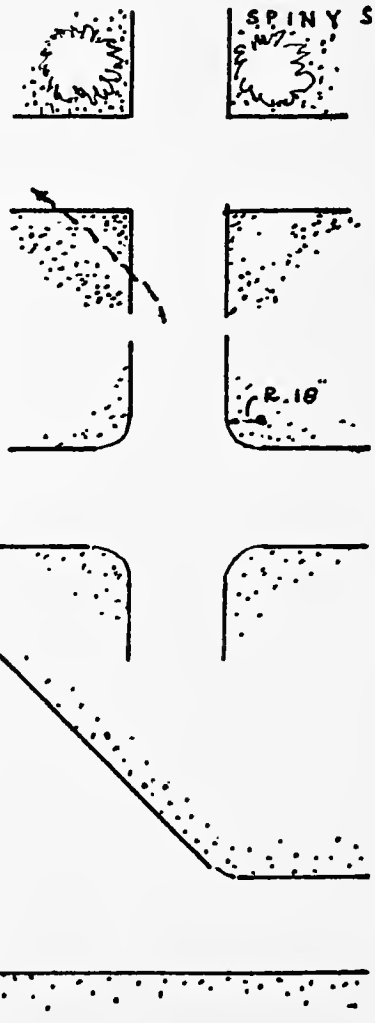
C


15'
5'-6"

D


SHORT
CUT

E


SPINY SHRUB
R.18"

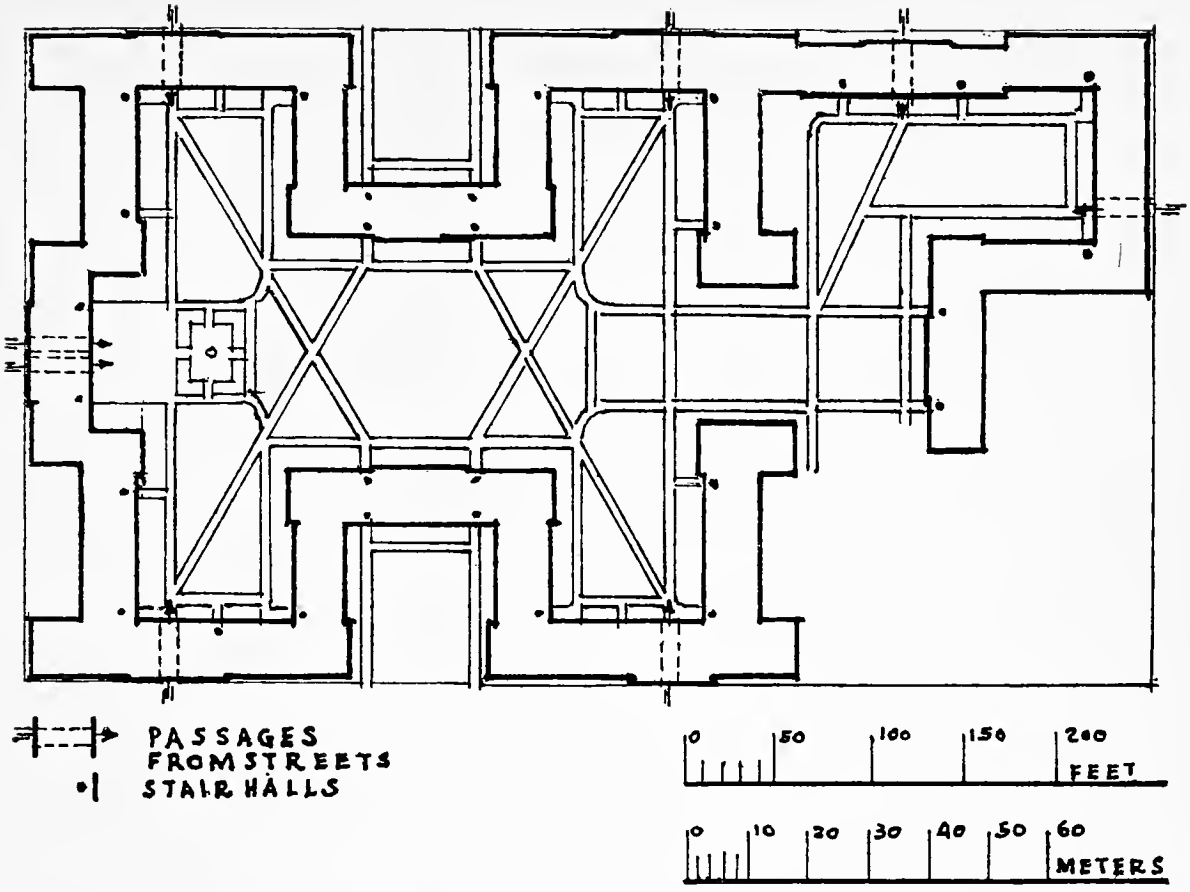


Figure 193 (opposite page). A. Center path. B. Double paths. C. Sidewalk elevation in relation to window sill. D. End of open court. E. Intersections. Figure 194 (above). Walks planned for short cuts. Michigan Boulevard Gardens, Chicago, Illinois. Eugene Henry Klaber and Ernest A. Grunsfeld, Jr., architects; Henry Wright & Associates, consultants.

Steps People walk at different tempo and with a different stride outdoors than indoors. Consequently, exterior steps should have shorter risers and wider treads than interior steps. Figure 195 shows maximum and preferred pitch for steps in walks. On approaching a building entrance, the average pedestrian slows up a bit and therefore entrance steps may be a trifle steeper. Wherever possible, ramps rather than steps should be used in walks, especially in cold climates. Where steps occur at slopes, railings may be omitted if the steps are low and broad; it is inadvisable to have more than six risers in a run without an intermediate landing. Ramps should parallel the run of steps if the walk is likely to be used frequently for perambulators, furniture dollies, or service hand trucks.

Three examples are given of steps at retaining walls. If the entire run is beyond the face of the wall, railings are a necessity for more than three risers. If steps go down between cheek walls, the latter are an annoyance if, at any riser, they are above elbow level, and the flight should be partially projected, as shown in the drawing at the right.

Drainage Disposal of roof water is always a problem. It is not absorbed by the surfaces where it falls and must be channeled off quickly. If drainage is towards the eaves, gutters and down-spouts should be provided,

otherwise grass and small shrubs near the building may be ruined. At the ground level it should be piped away and not allowed to spread over the ground. If the soil is porous, dry wells may serve as points of ultimate disposal, but if it is impervious, a system of storm drains is indicated, leading to road gutters or other channels or sewers, where it can flow off rapidly.

To care for water falling on the ground, the earth should be graded away from buildings at a slope of not less than 2%. Because of the roots of grass, shrubs, and trees, the ground will usually absorb a light rainfall. For heavy precipitation there must be some additional provision. Paths are sometimes used for this purpose—a questionable practice, especially in cold climates. A simple device frequently used is the grass gutter, an artificial swale in the lawn surface either side of the path with culverts at intersections. Catch basins connected to storm drains should be installed wherever the accumulation of surface water promises to be heavy, on flat lawns, at low points of the site and of road gutters.

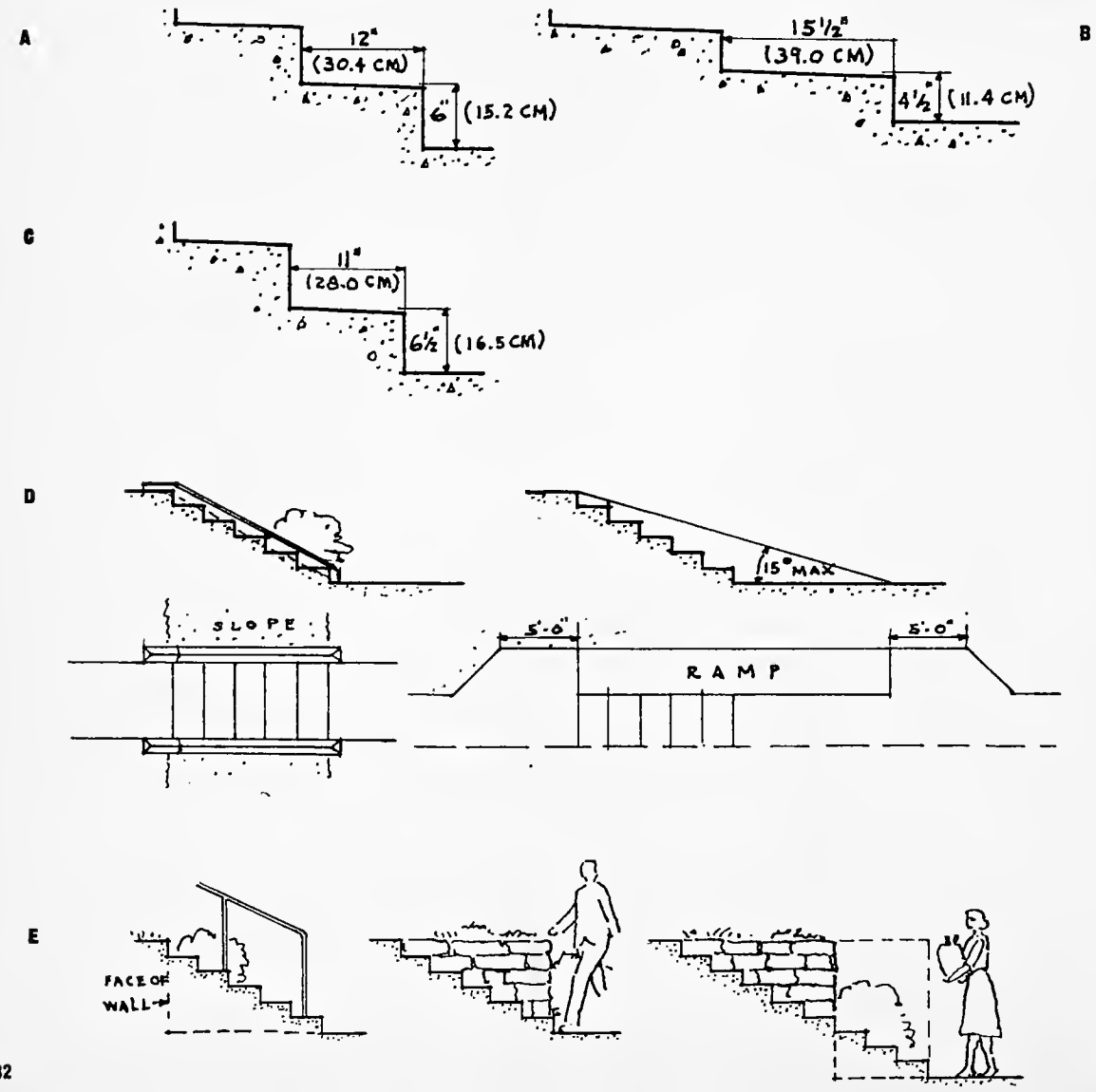


Figure 195. Steps in walks. A. Maximum pitch. B. Preferred pitch. C. Pitch at entrances. D. Steps in slopes. E. Steps at retaining walls.

Residential Character

The following pages of half-tones contain pictures of housing developments which in the opinion of the writer have a distinctly residential character. Avowedly, they are just one man's choice, and some readers may not agree with that choice. Perhaps we can agree on this: form may follow function, but only if the architect gives it a shove in that direction. Character of residential buildings is not an automatic result of a structural system. It is created by the artistry of man, who adds to the bricks and mortar something that evokes an emotional response, either through form, color, or association of ideas, which tells a person that the thing he sees might be a home and not an army barracks, a loft building, or a stack of pigeon holes. He may even feel it embodies that undefinable attribute we call beauty.

There are no applicable rules for this game. The end is achieved most often when the designer looks upon his work as a job to be done in the best way he knows how, without worrying about any preconceived philosophy of design which he feels he must follow. If he works in this spirit, what he produces will inevitably display his philosophy and his deepest emotional inheritance.

It has not been possible to show pictures of all the housing which we admire, but it might not be out of place to mention a few more which have given pleasure:

1. Manhattan House, New York City; Mayer & Whittlesey, Skidmore, Owings & Merrill, Architects.

2. Housing of the Farm Security Administration; Vernon de Mars, Architect.

3. Cedar Central, Cleveland, Ohio; Walter R. MacCornack, Architect; Henry Wright, Consultant.

4. Eastgate Apartments, Cambridge, Massachusetts; Koch, Kennedy, Rapson, DeMars, Architects.

5. Hill Creek Houses, Philadelphia, Pennsylvania; Thomas & Martin; Walter Antrim, Architects.

6. Channel Heights Project, Long Beach, California; Richard J. Neutra, Architect.

7. Olentangy Village, Columbus, Ohio; Raymond C. Snow, Architect.

8. Parklane Apartments, Houston, Texas; Talbott Wilson & Irwin Morris, Architects.

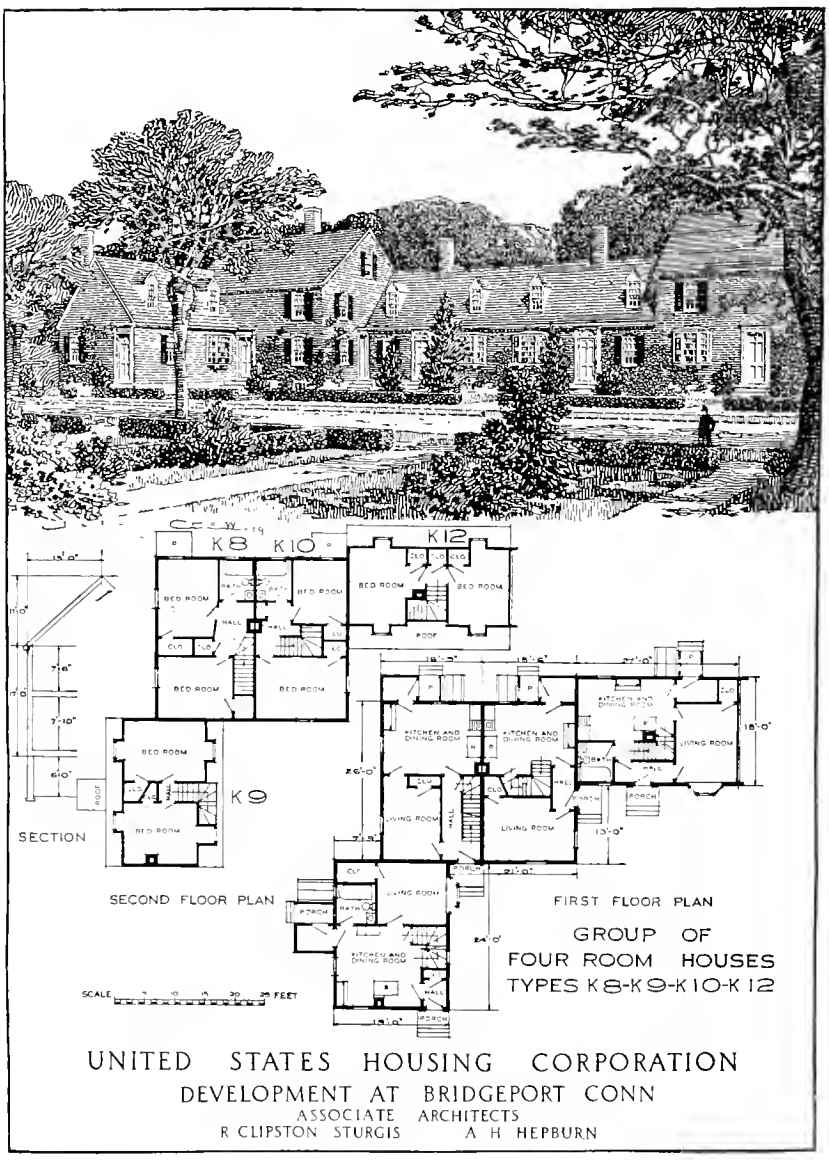


Figure 196 (top). The men who originally owned this housing were not concerned with esthetics or primarily with real estate profits. Their mill was operated by water power; they needed workers who lived nearby, so they built homes to rent to them. Since they had sufficient land and expected to continue in ownership of the buildings, there was no incentive for sliver subdivision and every reason for good construction. The builder, a good craftsman, did an excellent job for them. Result: over a century later the property was transformed into a modern garden development by the addition of plumbing, partitions, and paint. Dwellings and environment which provide the essentials of good human living will not depreciate completely in forty years, nor in eighty for that matter. Chicopee Falls, Massachusetts. Figure 197 (bottom). The New England tradition, so evident at Chicopee Falls, is continued in this public housing for the U.S. Housing Corporation, built during World War I and for the same purpose: homes for workers in a rapidly expanding industrial center. Crane Tract, Bridgeport, Connecticut. R. Clipston Sturgis, architect; A. H. Hepburn, associate architect.

Figure 198 (top). Here is an excellent example of successful collaboration of architects and landscape architects in a public development. The overhangs of canopies and balconies and occasional courses of projecting brickwork are the only decorative elements, yet they are sufficient to give life to what might otherwise have been box-like structures. Lakeview Terrace, Cleveland, Ohio. Joseph L. Weinberg, William H. Conrad, and Wallace G. Teare, architects; Alexander & Strong, landscape architects. *Figure 199 (bottom). An interesting example of the use of inexpensive materials to produce a decorative effect, again demonstrating that it is not the mode of design which counts, but the designer. Evidently the landscape architect had inadequate funds at her disposal. Very wisely she put the available money into planting trees. Edwin Markham Houses, Staten Island, New York.* DeYoung & Moscowitz and Frederick Mathesius, architects; Alice Recknagle, landscape architect. Courtesy of New York City Housing Authority.

Figure 200 (top). The form of this building is the conventional U-shape with a central court. With the simplest media plus restraint, good proportions, and discreet planting, the architects have created a structure of distinction, variety, and charm. Student Housing, Austin, Texas. Page, Southerland & Page, architects. *Figure 201 (bottom). This is public housing. It demonstrates cogently that "public" is not a synonym of "sterile," "stupid," or "regimented." The pleasing effect of this group has been attained by good proportion of masses, well studied fenestration, and simple decorative effect in the handling of the brickwork. The landscape architect contributed much to rounding out the picture of a pleasant living environment. Harlem River Houses, New York.* Archibald M. Brown, Horace Ginsbern, Charles F. Foller, Richard W. Buckley, John Lewis Wilson, Frank J. Forster, Will Rice Amon, architects; Michael Rapuano, landscape architect. Courtesy of New York City Housing Authority.

Figure 202 (top). One would hardly imagine oneself in a metropolitan area! An excellent example of the added possibilities of large scale development. Note the good relation of the scale of buildings, trees and shrubs. Phipps Houses, Queens, New York. Clarence S. Stein, architect; Marjorie S. Cautley, landscape architect. *Figure 203 (bottom). In this medium-rental private project, projecting courses of red brick on a buff background provide an element of color interest, and the vertical treatment of the staircases creates points of emphasis that lend both variety and unity to the entire group of buildings. Michigan Boulevard Gardens, Chicago, Illinois.* Eugene Henry Klaber and Ernest A. Grunsfeld, Jr., architects; Henry Wright & Associates, consultants.

Figure 204 (top). In this public housing project a residential character has been achieved by simple means; good proportion and articulation of the building masses, a few band courses, and canopies over the entrance doors. In a word, these buildings didn't just happen; they were designed! Amsterdam Houses, New York. Grosvenor Atterbury, Harvey W. Corbett, Arthur C. Holden, architects; Clark, Rapuano & Holleran, landscape architects. Courtesy of New York City Housing Authority. *Figure 205 (bottom). If these semi-detached houses had been built in a line along a street frontage, the effect of the group might have been lost. Since this is a rental project, a street frontage was not imperative. Although tenants must walk a bit farther to traffic ways, once home they enjoy quiet and restful surroundings. The gentleman in the chair seems to confirm this opinion. Hillside Houses, Meadville, Pennsylvania.* E. A. and E. S. Phillips, architects; site plan by Kastner & Stonorov, architects.

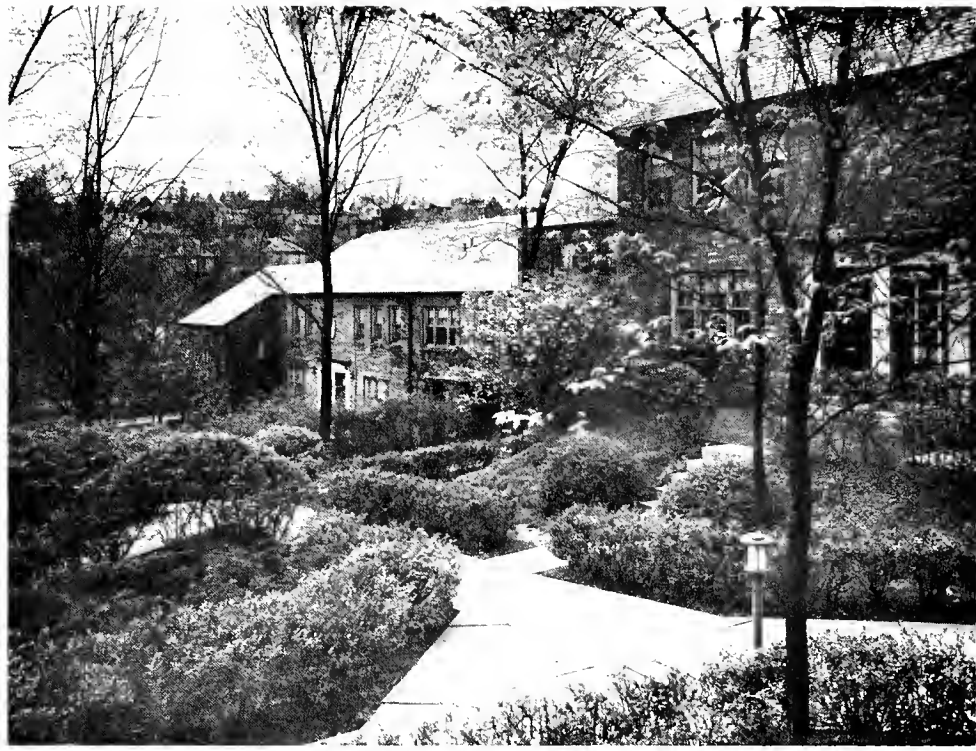


Figure 206 (top). One of the older large-scale housing developments and still one of the best in the country. Working with a difficult terrain, the planners, architects, and landscape architects have created an ensemble of quiet beauty. Compare this with the average development of row houses. Chatham Village, Pittsburgh, Pennsylvania. Ingham & Boyd, architects; Clarence S. Stein and Henry Wright, site planners and consulting architects; Griswold & Cohankie, landscape architects. *Figure 207 (bottom). This picture reveals the measure in which residential character is augmented by the environmental factors of careful placing of buildings and fine planting. Radburn, New Jersey.* Clarence S. Stein and Henry Wright, town planners; Marjorie S. Cautley, landscape architect. Gretchen Van Tassel, photographer.

Figure 208 (top). Open space, fine planting, and simple and direct architectural expression are the keynotes of this attractive living environment. The color value of the sloping roofs enhances the effect of the buildings, which otherwise might appear to be fading into the light background of the sky. Wyvernwood, Los Angeles, California. David J. Witmer, Loyall F. Watson, Lowell W. Pidgeon, architects; Hammond Sadler, landscape architect. *Figure 209 (bottom). The simplicity, fine proportions, and elegant restraint of the buildings at Baldwin Hills Village make it an outstanding achievement of architectural design. A pointed example of the difference between manners and mannerisms! Baldwin Hills Village, Los Angeles, California.* Reginald D. Johnson, Wilson, Merrill & Alexander architects; Clarence S. Stein, consulting architect; Fred Barlow, landscape architect. Margaret Lowe, photographer.

Bibligraphy

There would be little point to listing the many books which have been written on various phases of housing, since most of them have little to do with housing design, per se, which is the theme of this book. Few of them can be said to be background for it. There are two reasons for this: first, *Housing Design* is itself intended to be a background; second, most of what I know about housing is derived from bull sessions and buildings, not from books. I shall therefore content myself with listing those which have been of direct assistance to me in writing it:

Apartment Houses, Joseph H. Abel and Fred N. Severud, Reinhold, 1947.

Planning the Neighborhood, American Public Health Association, Public Administration Service, Chicago, 1948.

Planning Profitable Neighborhoods, Federal Housing Administration, U. S. Government Printing Office, Washington, D. C.

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Planning the Site, U.S.H.A. Bulletin No. 11, U. S. Government Printing Office, 1939.

Public Housing Design, F.P.H.A., U. S. Government Printing Office, 1946.

The Significance of the Work of the New York Housing Authority, New York Chapter A.I.A., 1949.

Standards, National Recreation Association, New York.

Housing & Social Structure, Anthony F. C. Wallace, Philadelphia Housing Authority, 1952.

Translation of Terms

FOOT AND METRIC EQUIVALENTS		FUSSMAASSE UND METRISCHE AEQUIVALENTEN		EQUIVALENTES DE UNIDADES INGLESAS EN METROS	
One inch equals	.0254 meters	1 zoll ist	.0254 meters	Una pulgada equivale a	.0254 métros
One foot equals	.3048 meters	1 fuss ist	.3048 meters	Un pie equivale a	.3048 métros
One yard equals	.9144 meters	1 yard ist	.9144 meters	Una yarda equivale a	.9144 métros

EQUIVALENCE DES PIEDS ET POUCES EN METRES		PIEDI E SISTEMA METRICO EQUIVALENTE	
Un pouce est égal à	.0254 mètres	1 pollice ugualia	.0254 metri
Un pied est égal à	.3048 mètres	1 piede ugualia	.3048 metri
Un yard est égal à	.9144 mètres	1 yard ugualia	.9144 metri

TERMS USED ON PLANS	DEUTSCH	ESPANOL	FRANCAIS	ITALIANO
Living room	Wohnzimmer	Sala	Salle de séjour	Camera da soggiorno
Dining area	Essraum	Lugar destinado a comedor	Coin des repas	Area da pranzo
Dining room	Esszimmer	Comedor	Salle à manger	Camera da pranzo
Dining alcove	Esserker	Rincón para comedor	Coin des repas	Area da pranzo
Dining foyer	Essvorraum	Parte del recibidor destinado a comedor	Coin des repas combiné avec le hall d'entrée	Foyer da pranzo
Kitchen	Kueche	Cocina	Cuisine	Cucina
Kitchenette	Kochnische	Cocinilla fija	Petite cuisine	Cucinetta
Bathroom	Bad	Sala de baño	Salle de bains	Bagno
Bedroom	Schlafzimmer	Alcoba	Chambre à coucher	Camera da letto
Foyer	Eingangsdiele	Recibidor	Entrée	Foyer
Hall	Diele	Pasillo	Hall	Vestibolo
Closet	Wandschrank	Ropero	Placard	Armadio
Main stairs	Haupt-Treppe	Escalera principal	Escalier principal	Scala principale
Service stairs	Dienst-Treppe	Escalera de servicio	Escalier de service	Scala di servizio
Garage	Garage	Garaje	Garage	Rimessa automobili
Parking area	Auto Parkstelle	Parque de estacionamiento	Parking	Parkeggio
Play area	Spielplatz	Parque de recreo	Terrain de jeux	Area da giuoco
OTHER TERMS				
Elevator	Fahrstuhl	Ascensor	Ascenseur	Ascensore
Walk-up	Haus ohne Fahrstuhl	Edificio sin ascensor	Immeuble sans ascenseur	Casa senza ascensore
Garden apartment	Garten Mietswohnung	Edificio de apartamientos con jardín en communidad	Appartement dans un immeuble de 2 ou 3 étages entouré des jardins	Appartamento giardino
Rowhouse	Reihenwohnhaus	Conjunto de casas contiguas	Habitations en bande continue	Case a schiera
Flat	Mietswohnung	Piso	Appartement	Appartamento
Joist	Balken	Vigueta	Solive	Travetto
Cut-out	Modellansicht	Modelo	Découpé	Dettaglio
Radiator	Heizkorper	Radiador	Radiateur	Radiatore
Snack	Imbiss	Refrigerio	Casse croute	Spuntino
Slum	Schmutzige hintergasse	Barriada pobre	Quartier insalubre	Area in rovina
Furred (down)	Hängend	Paredes o techos cubiertos de forma que se cree un espacio de ventilacion en su interior	Suspendu	Sospeso
Laundry	Waschkueche	Lavadero	Buanderie	Lavanderia
Utilities	Versorgungsbetriebe	Servicios publicos	Eau, gas, electricité	Servizi
Trash	Mull	Escombros	Débris	Immondizia
Garbage	Abfall	Basura	Ordures	Rifiuti
Roughing (plumbing)	Im Groben	Tuberia	Tuyaux de plomberie	Misure d'installazione
Supplies	Vorraete	Abastecimientos	Fournitures	Accessori e apparecchi sanitari
Stall shower	Duscheschrank	Ducha	Douche	Deccia isolata
Eaves	Dachfuss Dachgesims	Aleros	Larmier	Linee di gronda
Gutters	Dachrinnen	Cañerias	Gouttière	Canaloni di raccolta
Down spouts	Dachrinnen Auslauf	Bajantes	Descente	Pluviali
Mortgage	Hypotheke	Hipoteca	Hypothèque	Ipoteca

Index

Date Due

Due	Returned	Due	Returned
OVERNIGHT RESERVE RELEASED FROM RESERVE RESERVE DESK K29			
SEP 23 '64 ML	SEP 15 '64		
NOV 18 '70	NOV [illegible]		
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